



# NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

## THESIS

**COMPARATIVE INTERNATIONAL AIR CARGO  
SOLUTIONS: THE PATHWAY TO A RESILIENT,  
ADAPTABLE, BALANCED AND SUSTAINABLE SECURE  
GLOBAL AIR CARGO SUPPLY CHAIN**

by

Thomas P. Guglielmo

December 2013

Thesis Advisor:

John Rollins

Second Reader:

Lauren Wollman

**Approved for public release; distribution is unlimited**

**THIS PAGE INTENTIONALLY LEFT BLANK**

**REPORT DOCUMENTATION PAGE**
*Form Approved OMB No. 0704-0188*

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.

<b>1. AGENCY USE ONLY (Leave blank)</b>	<b>2. REPORT DATE</b> December 2013	<b>3. REPORT TYPE AND DATES COVERED</b> Master's Thesis
<b>4. TITLE AND SUBTITLE</b> COMPARATIVE INTERNATIONAL AIR CARGO SOLUTIONS: THE PATHWAY TO A RESILIENT, ADAPTABLE, BALANCED AND SUSTAINABLE SECURE GLOBAL AIR CARGO SUPPLY CHAIN		<b>5. FUNDING NUMBERS</b>
<b>6. AUTHOR(S)</b> Thomas P. Guglielmo		<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> Naval Postgraduate School Monterey, CA 93943-5000		
<b>9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> N/A		<b>10. SPONSORING/MONITORING AGENCY REPORT NUMBER</b>
<b>11. SUPPLEMENTARY NOTES</b> The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government. IRB Protocol number ____ N/A ____.		
<b>12a. DISTRIBUTION / AVAILABILITY STATEMENT</b> Approved for public release; distribution is unlimited	<b>12b. DISTRIBUTION CODE</b> A	
<b>13. ABSTRACT (maximum 200 words)</b>  A substantial challenge to reducing security gaps in the international air cargo supply chain is the lack of a method of evaluating existing levels of risk based upon points of origin, points of departure and cargo and aircraft type. This is particularly challenging since the current United States air cargo security protocol requires the 100 percent screening of all air cargo without objectively analyzing or evaluating the risk posed by the air cargo.  This thesis proposes a risk-based intelligence driven approach to identify and mitigate the threat of the successful introduction of an improvised explosive device into the international air cargo supply chain. The primary thrust of this research effort is to conduct a comparative analysis of the United States international air cargo policies and the European Union's international air cargo policies as a means of evaluating and proposing a risk based intelligence driven international air cargo policy that capitalizes on the strengths of United States and European Union's systems.		

<b>14. SUBJECT TERMS</b> International Air Cargo, Air Cargo Security, Air Cargo Supply Chain, Risk Based Security, Secure Supply Chain		<b>15. NUMBER OF PAGES</b> 101	
<b>16. PRICE CODE</b>			
<b>17. SECURITY CLASSIFICATION OF REPORT</b> Unclassified	<b>18. SECURITY CLASSIFICATION OF THIS PAGE</b> Unclassified	<b>19. SECURITY CLASSIFICATION OF ABSTRACT</b> Unclassified	<b>20. LIMITATION OF ABSTRACT</b> UU

NSN 7540-01-280-5500

 Standard Form 298 (Rev. 2-89)  
 Prescribed by ANSI Std. Z39-18

**THIS PAGE INTENTIONALLY LEFT BLANK**

**Approved for public release; distribution is unlimited**

**COMPARATIVE INTERNATIONAL AIR CARGO SOLUTIONS:  
THE PATHWAY TO A RESILIENT, ADAPTABLE, BALANCED AND  
SUSTAINABLE SECURE GLOBAL AIR CARGO SUPPLY CHAIN**

Thomas P. Guglielmo  
Assistant Federal Security Director for Law Enforcement,  
Transportation Security Administration, East Elmhurst, NY  
B.S., Kaplan University, 2007

Submitted in partial fulfillment of the  
requirements for the degree of

**MASTER OF ARTS IN SECURITY STUDIES  
(HOMELAND SECURITY AND DEFENSE)**

from the

**NAVAL POSTGRADUATE SCHOOL  
December 2013**

Author: Thomas P. Guglielmo

Approved by: John Rollins  
Thesis Advisor

Lauren Wollman  
Second Reader

Mohammed Hafez  
Chair, Department of National Security Affairs

**THIS PAGE INTENTIONALLY LEFT BLANK**

## **ABSTRACT**

A substantial challenge to reducing security gaps in the international air cargo supply chain is the lack of a method of evaluating existing levels of risk based upon points of origin, points of departure and cargo and aircraft type. This is particularly challenging since the current United States air cargo security protocol requires the 100 percent screening of all air cargo without objectively analyzing or evaluating the risk posed by the air cargo.

This thesis proposes a risk-based intelligence driven approach to identify and mitigate the threat of the successful introduction of an improvised explosive device into the international air cargo supply chain. The primary thrust of this research effort is to conduct a comparative analysis of the United States international air cargo policies and the European Union's international air cargo policies as a means of evaluating and proposing a risk based intelligence driven international air cargo policy that capitalizes on the strengths of United States and European Union's systems.

**THIS PAGE INTENTIONALLY LEFT BLANK**

## TABLE OF CONTENTS

I.	INTRODUCTION.....	1
A.	PROBLEM SPACE .....	1
B.	RESEARCH QUESTIONS.....	8
C.	RESEARCH METHOD .....	9
D.	CHAPTER OVERVIEW .....	10
II	CHALLENGES.....	13
A.	AIR CARGO GAP ANALYSIS.....	13
III.	LITERATURE REVIEW .....	17
A.	PRE-9/11 ATTACKS.....	19
1.	International Air Cargo .....	19
2.	Pre-9/11 Risk .....	21
B.	POST-9/11 ATTACKS .....	24
1.	International Air Cargo .....	24
2.	Post-9/11 Risk .....	28
C.	POST-PRINTER-TONER ATTACK .....	30
1.	International Air Cargo .....	30
2.	Post-Printer-Toner Attack Risk .....	32
IV.	RISK.....	33
V.	DATA AND INTELLIGENCE EVALUATION.....	37
A.	THE U.S. AIR CARGO SYSTEM .....	37
B.	THE EUROPEAN UNION AIR CARGO SYSTEM.....	40
C.	THE PROPOSED AIR CARGO POLICY CHANGE .....	43
VI.	JURISDICTIONAL HURDLES .....	45
A.	THE U.S. AIR CARGO SYSTEM .....	46
B.	THE EU AIR CARGO SYSTEM.....	48
C.	THE PROPOSED AIR CARGO POLICY .....	49
VII.	AIR CARGO SECURITY SYSTEM COSTS .....	51
A.	THE AIR CARGO SYSTEM .....	51
B.	THE PROPOSED AIR CARGO POLICY .....	55
VIII.	RECOMMENDATIONS AND CONCLUSIONS.....	57
A.	ADOPTION OF A RISK BASED INTELLIGENCE DRIVEN AIR CARGO SCREENING PROTOCOL.....	57
1.	Tier One .....	59
2.	Tier Two.....	59
3.	Tier Three .....	60
B.	CHALLENGES TO IMPLEMENTATION.....	61
C.	LIMITATIONS OF THE RESEARCH.....	63
	LIST OF REFERENCES .....	65

<b>SOURCES CONSULTED.....</b>	<b>73</b>
<b>INITIAL DISTRIBUTION LIST .....</b>	<b>81</b>

## LIST OF FIGURES

Figure 1.	Layers of U.S. Aviation Security .....	7
Figure 2.	Cargo Bomb Was Set to Blow Up over the United States.....	13
Figure 3.	Air Cargo Environment Overview.....	17
Figure 4.	Risk Analysis and Mitigation Cycle .....	33
Figure 5.	TSA Functions in Security Threat Assessment Process .....	38
Figure 6.	European Union 3rd County Airport Process .....	42
Figure 7.	Weak Links in the Air Cargo Chain .....	45
Figure 8.	Security Costs and Economic Impact .....	51
Figure 9.	Risk-Based Screening .....	58

**THIS PAGE INTENTIONALLY LEFT BLANK**

## **LIST OF ACRONYMS AND ABBREVIATIONS**

ACAS	Air Cargo Advanced Screening
AQAP	Al-Qaeda in the Arabian Peninsula
ATSA	Aviation Transportation Security Act
CBP	Customs and Border Protection
CCSF	Certified Cargo Screening Facility
CCSP	Certified Cargo Screening Program
CRS	Congressional Research Service
DHS/OIG	Department of Homeland Security/Office of the Inspector General
DOS	Department of State
EU	European Union
FAA	Federal Aviation Administration
FBI	Federal Bureau of Investigations
GAO	Government Accountability Office
HSC	Homeland Security Council
IAC	Indirect Air Carrier
IACMS	Indirect Air Carrier Management System
IC	Intelligence Community
IED	Improvised Explosive Device
INTERPOL	International Criminal Police Organization
ITA	Intelligence and Threat Analysis
JVA	Joint Vulnerability Assessments
KSMS	Known Shipper Management System
KSP	Known Shipper Program
NTC	National Targeting Center
SD	Security Directives
SETL	Security Environment Threat List
STA	Security Threat Assessments

TSA	Transportation Security Administration
TSA-OI	Transportation Security Administration-Office of Intelligence
TSI	Transportation Security Inspectors
TSI-C	Transportation Security Inspectors-Cargo

## **EXECUTIVE SUMMARY**

### **A. INTRODUCTION**

As noted in numerous government and industry reports, the current international application of the congressionally mandated 100 percent air cargo screening requirement is currently unattainable. A portion of the problem with the implementation of the mandate is the inability of the Transportation Security Administrations (TSA) to enforce air cargo screening requirements beyond the U.S. territorial borders. Additionally, if the jurisdictional authority existed, the infrastructure necessary to meet the 100 percent security screening requirements as required by the Aviation Transportation Security Act (ATSA) simply does not exist within the international air cargo supply chain. The administration’s regulatory capabilities, while sufficient for domestic enforcement, fall short of what would be required to enforce administrative screening requirements in foreign nations.

To that end, in March 2012, Customs and Border Protection (CBP) and the TSA created a pilot program known as the Air Cargo Advanced Screening (ACAS) program with the intent of leveraging the capabilities of each agency.<sup>1</sup> The goal of this pilot program was to streamline the processes and procedures for the advanced screening of international air cargo through the collection and analysis of shipping and shipper data. The objective of this data collection was to create a “trusted shipper” and “trusted shipment” system that could be combined with the information available in CBP’s automated targeting system. While this process provides an opportunity for CBP and the TSA to ensure shippers have been vetted prior to providing cargo for shipment by aircraft, it does not allow the TSA or CBP to establish effectively the level of risk the cargo or its point of origin may present to the aircraft.<sup>2</sup> While these programs and administrative advances are beneficial, the failure to apply a risk-based and intelligence

---

<sup>1</sup> U.S. Customs and Border Patrol Transportation Security Administration, *Air Cargo Advanced Screening Pilot Strategic Plan*, March 2012.

<sup>2</sup> Ibid.

driven protocol designed to target shippers, shipments, points of origin, and regions that pose the greatest threat to air cargo still needs to be addressed.

## B. PROBLEM STATEMENT

Exploring the issues surrounding international air cargo security is as important as ever. The cost of a successful attack on the commercial aviation system that results in a seven-day shutdown of commercial aviation would be between \$248 billion to \$394 billion during the two-year recovery period resulting from the attack, according to the Center for Risk and Economic Analysis of Terrorism Events at the University of California. For the past three decades, terrorists have actively attempted to exploit weaknesses in the aviation industry as a means of weakening the U.S. economy and causing fear in society. Specifically, terrorist organizations have regularly targeted U.S. citizens and its economy by attempting to detonate explosive devices on passenger and cargo aircraft. As quoted in the November 2010 special edition of *Inspire* magazine, and reported by Al Jazeera, Al Qaeda stated, “We are laying out for our enemies’ our plan in advance because as we stated earlier our objective is not maximum kill, but to cause [damage] in the aviation industry, an industry that is so vital for trade and transportation between the US and Europe.” These attacks and attempted attacks have regularly involved the use of improvised explosive devices (IEDs). In an analysis conducted by the Homeland Security News Wire after the Boston Marathon bombings, it was determined by START “that IEDs were the most common weapons used in the 207 terrorist plots and attacks in the United States from 2001 to 2011.” In the past three decades, terrorists have sought to disrupt the U.S. economy by attacking aviation. While the most successful of these attacks involved hijacking, the most consistent means of attack involved the attempted detonation of IEDs on aircraft.

As policies and technologies were introduced to counter the IED threat, terrorists have shifted the means of introducing an IED onto an aircraft. They have now focused on the vulnerabilities that exist in the air cargo environment. Prior to the attacks that occurred on September 11, 2001, the Federal Aviation Administration (FAA) was responsible for aviation security and had implemented a number of recommendations,

mandates, and security directives to improve modern aviation security starting in 1990. After each of these attacks, the FAA and now the Transportation Security Administration (TSA) attempted to institute security directives that would detect, deter, or prevent future attacks. Existing regulations, policies, and procedures were reviewed and amended to meet the evolving threat. In certain instances, Congress stepped in and passed legislation designed to close real and perceived gaps in aviation security. One of these legislative solutions was the 100 percent air cargo-screening requirement, which was passed in 2007. In each instance, the improved processes failed to detect or prevent the future attacks.

### C. RESEARCH QUESTIONS

The primary question this thesis addressed is can a multi-layered, intelligence-driven air cargo security protocol be developed from existing programs to decrease the threat posed by a cargo-borne incendiary device or IED?

In addition, this thesis considered the following questions. How can the TSA in collaboration with CBP better apply risk categories to the international air cargo screening requirements to decrease the probability of a successful terrorist attack on air cargo? Which programs are suited to this collaboration, which systems create unnecessary redundancies, and do new programs need to be established?

This thesis attempted to confirm the following suppositions.

- A risk-based international air cargo screening protocol provides the flexibility necessary to adjust to the changing threats and the technological advancements in the air cargo industry.
- A risk-based international air cargo screening protocol will provide the adaptability necessary to adjust to the threat environment based on the associated risks rather than treating all threat environments as equal.
- A risk-based international air cargo screening protocol will provide a sustainable security process while simultaneously meeting the needs of the air cargo industry.

### D. ANALYSIS

A comparative analysis of the processes and producers applied by the European Union (EU) was conducted to evaluate the practicality of using a risk-based intelligence

driven air cargo security screening process that accounts for differences in vulnerabilities while additionally creating a universal framework that can be applied over several differing jurisdictions. To this point, the requirements imposed by the European upon the member states are not dissimilar from those that the TSA imposes on known shippers in the United States. The policies of the European Union and the United States diverge when risk and consequence are inserted into the security equation by the European Union as a means of mitigating risk. The application of a risk and consequence-based security protocol, as seen in the EU application of varying security requirements dependent of class of aircraft, is in direct conflict with the regulatory requirement imposed on the TSA by the congressionally mandated 100 percent air cargo screening process.

## **E. RECOMMENDATIONS**

This thesis makes the following recommendations and assertions.

- A risk-based intelligence driven process for the screening of international air cargo should be developed and implemented for application prior to the introduction of air cargo into the global supply chain. This process would be designed with the intention of enhancing air cargo security without overwhelming the aviation industry with unrealistic goals and expectations.
- A risk assessment methodology would be applied to air cargo and mail security that recognizes that different portions of the supply chain are subject to varying security strengths and vulnerabilities, and as such, do not represent an equal levels of risk.
- The current 100 percent air cargo security screening process fails to recognize these differences, and is both cumbersome to the industry, and an inefficient use of valuable security and law enforcement resources.

## **ACKNOWLEDGMENTS**

I would like to thank, first and foremost, my wife, Tara, for her devotion to our family and for her willingness to make the sacrifices necessary to allow me to take advantage of this amazing educational opportunity. Thanks also to my children, Patrick and Sean, for their unconditional love, sacrifice and support.

I will be forever grateful to the homeland security professionals who endorsed my candidacy in this outstanding program, Director Robert Bray, SAC William Hall, and ASAC Scott Carpender, all of whom changed the course of my future through their trust in my abilities.

I owe a debt of gratitude to my thesis committee, John Rollins and Dr. Lauren Wollman. The unique alliance of these two scholars provided me the motivation and opportunity to explore my role in homeland security.

I am thankful for the United States government's support of this program, which provides incredible opportunities for emerging leaders.

Last, I owe a sincere thanks to the staff at NPS, to the outstanding faculty, and to my classmates for the afternoons and evenings we spent in the library and social laboratory where we discussed and occasionally solved some of the problems within homeland security. This has been an amazing experience that I will never forget.

**THIS PAGE INTENTIONALLY LEFT BLANK**

## I. INTRODUCTION

### A. PROBLEM SPACE

Exploring the issues surrounding international air cargo security is as important as ever. The cost of a successful attack on the commercial aviation system that results in a seven-day shutdown of commercial aviation would be between \$248 billion to \$394 billion during the two-year recovery period resulting from the attack, according to the Center for Risk and Economic Analysis of Terrorism Events at the University of California.<sup>1</sup> For the past three decades, terrorists have actively attempted to exploit weaknesses in the aviation industry as a means of weakening the United States economy and causing fear in society. Specifically, terrorist organizations have regularly targeted U.S. citizens and its economy using explosive devices on passenger and cargo aircraft. As quoted in the November 2010 special edition of Inspire magazine and reported by Al Jazeera, Al Qaeda stated, “We are laying out for our enemies’ our plan in advance because as we stated earlier our objective is not maximum kill, but to cause [damage] in the aviation industry, an industry that is so vital for trade and transportation between the US and Europe.”<sup>2</sup> These attacks and attempted attacks have regularly involved the use of improvised explosive devices (IEDs). In an analysis conducted by the Homeland Security News Wire after the Boston Marathon bombings, it was determined by START “that IEDs were the most common weapons used in the 207 terrorist plots and attacks in the United States from 2001 to 2011.”<sup>3</sup> In the past three decades, terrorist have sought to disrupt the U.S. economy by attacking aviation. While the most successful of these attacks involved hijacking, the most consistent means of attack involved the attempted detonation of IEDs on aircraft.

---

<sup>1</sup> Peter Gordon, “The Economic Impacts of a Terrorist Attack on the U.S. Commercial Aviation System,” *Create Homeland Security Center at the University of Southern California*, October 1, 2005, <http://create.usc.edu/research/50796.pdf>.

<sup>2</sup> ALJAZEERA, “Al-Qaeda Wing to Target US Economy,” November 21, 2010, <http://www.aljazeera.com/news/middleeast/2010/11/2010112110484673847.html>.

<sup>3</sup> Homeland Security News Wire, “IEDs Growing Threat in U.S., Security Experts,” April 17, 2013 <http://www.homelandsecuritynewswire.com/dr20130417-ieds-a-growing-threat-in-u-s-security-experts>.

- On 12 December 1988, an explosive device was placed on Pan American flight 103, which detonated in the cargo hold and caused a terminal failure of the aircraft structure. The attack succeeded in killing 243 passengers, 16 crew members and 11 residents of Lockerbie Scotland where large sections of the fuselage landed.<sup>4</sup>
- On 22 January 1995, Ramsey Yousef conspired to place explosives on 10 American flagged commercial passenger aircraft bound for North America with the intent of causing simultaneous catastrophic airframe failures over the Pacific Ocean.<sup>5</sup>
- On 22 December 2001, Richard Reid attempted to detonate an explosive device hidden in his shoe on American Airlines flight 63 while over the Atlantic Ocean.<sup>6</sup>
- On 24 August 2004, Satsita Dzhebirkhanova and Amanta Nagayeva successfully detonated concealed IEDs on two separate aircraft in a coordinated attack that killed 90 people.<sup>7</sup>
- On 24 December 2009, Farouk Abdulmutallab attempted to detonate an IED secreted in his underwear on Northwest flight 253 while over the United States.<sup>8</sup>
- On 3 September 2010, Al-Qaeda in the Arabian Peninsula claimed responsibility for an attack on a Boeing 747-44AF (SCD) cargo plane, registered N571UP, which was destroyed in an accident shortly after takeoff from Dubai Airport (DXB), UAE. Both crewmembers were killed in the crash.<sup>9</sup>
- On 29 October 2010, Al-Qaeda in the Arabian Peninsula (AQAP) shipped two explosive devices by aircraft, which were discovered in separate cargo aircraft bound for the United States. These explosives were set to explode while in flight over the United States.<sup>10</sup>

---

<sup>4</sup> *Washington Post*, “The Bombing of Pan Am Flight 103,” 1999, <http://www.washingtonpost.com/wp-srv/inatl/longterm/panam103/timeline.htm>.

<sup>5</sup> CNN, “Plane Terror Suspects Convicted on All Counts,” September 5, 1996, <http://www.cnn.com/US/9609/05/terror.plot/>.

<sup>6</sup> CNN, “Exchange Between Reid Judge, Follows Life Sentence,” December 6, 2003, <http://www.cnn.com/2003/LAW/01/30/shoebomber.sentencing/>.

<sup>7</sup> Associated Press, “Russia Plane Crashes Caused by Explosives,” August 30, 2004, [http://www.nbcnews.com/id/5810127/ns/world\\_news/russia-plane-crashes-caused-explosives/#.UIBkZRaPCZY](http://www.nbcnews.com/id/5810127/ns/world_news/russia-plane-crashes-caused-explosives/#.UIBkZRaPCZY).

<sup>8</sup> David Ariosto and Deborah Feyerick, “Christmas Day Bomber Sentenced to Life in Prison,” CNN, February 17, 2012, <http://www.cnn.com/2012/02/16/justice/michigan-underwear-bomber-sentencing>.

<sup>9</sup> ALJAZEERA, “Al-Qaeda Wing to Target US Economy.”

<sup>10</sup> *The Telegraph*, “Ink Cartridge Bomb Reveals Innovation of Terrorist Group,” October 30, 2010, <http://www.telegraph.co.uk/news/uknews/terrorism-in-the-uk/8098587/Ink-cartridge-bomb-reveals-innovation-of-terrorist-groups.html>.

As policies and technologies were introduced to counter the IED threat, terrorists have shifted the means of introducing an IED onto an aircraft. They now focus on the vulnerabilities that exist in the air cargo environment. Prior to the attacks that occurred on September 11, 2001, the Federal Aviation Administration (FAA) was responsible for aviation security and had implemented a number of recommendations, mandates, and security directives to improve modern aviation security starting in 1990.<sup>11</sup> After each of these attacks, the FAA and now the Transportation Security Administration (TSA) attempted to institute security directives that would detect or prevent future attacks. Existing regulations, policies, and procedures were reviewed and amended to meet the evolving threat. In certain instances, Congress stepped in and passed legislation designed to close real and perceived gaps in aviation security. One of these legislative solutions was the 100 percent air cargo-screening requirement, which was passed in 2007. In each instance, the improved processes failed to detect or prevent the future attacks.

While airport passenger screening is the sole responsibility of the TSA, aviation cargo screening is a fractured system that involves the TSA, Customs and Border Protection (CBP), private corporations, freight forwarders, and shippers. These diverse stakeholders, each of who have separate goals that are not complementary—industry seeking profit and government seeking regulation—create vulnerabilities that continue to present aviation security challenges. Industry in the form of the aviation industry, freight forwarders, and shippers seek the most efficient and cost effective means of delivering products. Government, which is represented by the TSA and CBP, are focused on preventing successful attacks on this nation’s aviation industry with little regard for the security measures’ costs or the burdens placed on industry. David Widdowson and Stephen Holloway stated in a *World Customs Journal* article about transport security regulation, “many government responses to the international security threat merely lead to an increase in the regulatory burden on honest traders” without enhancing the security

---

<sup>11</sup> U.S. Government Accountability Office, *Report to Congressional Requesters, Aviation Security, Vulnerabilities and Potential Improvements for the Air Cargo System* (GAO-03-344), Washington, DC: GPO, 2002, <http://www.gao.gov/products/GAO-03-344>.

of high-risk shipments.<sup>12</sup> This vulnerability is further exacerbated by the inability of the TSA and CBP to regulate international air cargo bound for the United States. This vulnerability was highlighted in Congressional testimony when Pennsylvanian Congressman Charles Dent stated in his 2010 testimony before the Committee on Homeland Security that “TSA has no clear plan in place to address foreign in-bound cargo, thought the law requires it. Why is that? Not for a lack of effort, but because of a lack of authority.”<sup>13</sup> The current international air cargo screening processes are reminiscent of those that existed in the airport passenger-screening environment prior to September 11, 2001. The system relies on the industry acceptance, third-party contractor application, and regulatory enforcement to ensure the appropriate screening procedures are applied.

The TSA through the Aviation Transportation Security Act (ATSA) is tasked with regulating the screening of passengers and cargo.<sup>14</sup> This requirement is further codified in 49 CFR Part 1542–Airport Security, which outlines the regulatory relationship between the TSA and airport operators.<sup>15</sup> Cargo operations are regulated under 49 CFR Part 1544.205–Acceptance and Screening of Cargo, which states that aircraft operators are responsible for preventing the carriage of explosives in cargo onboard aircraft and how this should be accomplished.<sup>16</sup> It is this ambiguous screening requirement, which is further defined in 49 CFR Part 1548–Indirect Air Carrier Security, that creates the

---

<sup>12</sup> David Widdowson and Stephen Holloway, “Maritime Transport Security Regulation: Policies, Probabilities and Practicalities,” *World Customs Journal* 3, no. 2 (2009), <http://www.internationaltransportforum.org/2009/forum2009.html>.

<sup>13</sup> Charles Dent, “100 Percent Air Cargo Screening: Remaining Steps to Secure Passenger Aircraft, Hearing before the Subcommittee on Transportation Security and Infrastructure Protection,” 2010, <http://www.gpo.gov/fdsys/pkg/CHRG-111hhrg64699/html/CHRG-111hhrg64699.htm>.

<sup>14</sup> Govytrack.us., “S. 1447 (107th): Aviation and Transportation Security Act,” 2001, <http://www.govtrack.us/congress/bills/107/s1447>.

<sup>15</sup> U.S. Government Printing Office, “49 CFR Part 1542–Airport Security,” 2010, <http://www.gpo.gov/fdsys/granule/CFR-2010-title49-vol9/CFR-2010-title49-vol9-part1542/content-detail.html>.

<sup>16</sup> U.S. Government Printing Office, “49 CFR Part 1544.205–Aircraft Operator Security: Air Carriers and Commercial Operators,” 2010, <http://www.gpo.gov/fdsys/granule/CFR-2010-title49-vol9/CFR-2010-title49-vol9-part1544/content-detail.html>.

greatest vulnerability in air cargo operations by allowing 89 independent cargo screening facilities to certify the safety of air cargo while remaining subject to inspection by approximately 400 transportation security inspectors.<sup>17</sup>

Since its creation, the TSA has mandated increased industry security measures around cargo facilities and aircraft through the use of security directives that target these vulnerable assets. As an example, Transportation Security Inspectors (TSI) have increased cargo inspections, explosive detection canine teams have been added at airport cargo facilities, and training programs for air cargo workers have been created.<sup>18</sup> The TSA has additionally moved beyond the airport cargo preparation and receiving areas and is currently using over 1,200 facilities located outside airport properties for industry-supported cargo screening through the Certified Cargo Screening Program (CCSP).<sup>19</sup>

The Administration's regulatory capabilities, while sufficient for domestic enforcement, fall short of what would be required to enforce administrative screening requirements in foreign nations because of an inability of the Administration to enforce these requirements effectively in the international arena. This inability makes implementing and regulating the 100 percent air cargo-screening requirement problematic outside the U.S. jurisdictional boundaries. This weakness, which is shared by CBP, has been exploited by narcotics, human, and counterfeit merchandise smugglers, and remains the weakest link in the air cargo transportation chain. The TSA and CBP continue to seek administrative solutions to air cargo screening problems that reach beyond the authority granted to the administration.

---

<sup>17</sup> U.S. Government Printing Office, "49 CFR Part 1548—Indirect Air Carrier Security," 2002, <http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr;sid=c60b3377d4eaafad4feeecc6cd8f29983;rgn=div5;view=text;node=49 percent3A9.1.3.5.13;idno=49;cc=ecfr>.

<sup>18</sup> Transportation Security Administration, "Kip Hawley Assistant Secretary, Transportation Security Administration; Testimony to the Subcommittee on Homeland Security Committee on Appropriations," 2008, [http://www.tsa.gov/press/speeches/testimony\\_archives.shtm](http://www.tsa.gov/press/speeches/testimony_archives.shtm).

<sup>19</sup> Transportation Security Administration, "Certified Cargo Screening Program," n.d., <http://www.tsa.gov/certified-cargo-screening-program>.

To that end, in March 2012, CBP and the TSA created a pilot program known as the Air Cargo Advanced Screening (ACAS) program with the intent of leveraging the capabilities of each agency.<sup>20</sup> The goal of this pilot program was to streamline the processes and procedures for the advanced screening of international air cargo using data collection. The objective of this data collection was to create a “trusted shipper” and “trusted shipment” system that could be combined with the data available in CBP’s automated targeting system. While this process provides an opportunity for CBP and the TSA to ensure shippers have been vetted prior to providing cargo for shipment by aircraft, it does not allow the TSA or CBP to establish effectively the level of risk the cargo or its point of origin may present to the aircraft.<sup>21</sup> While these programs and administrative advances are beneficial, the failure to apply a risk-based and intelligence driven protocol designed to target shippers, shipments, points of origin, and regions that pose the greatest threat to air cargo still needs to be addressed. As noted by the Government Accountability Office (GAO) in 2011, “TSA currently uses a risk informed approach to schedule foreign airport assessments by categorizing airports into three tiers.”<sup>22</sup> These tiers would additionally be utilized to identify air cargo shippers and shipments that should be the emphasis of the ACAS system to ensure the most efficient use of the limited security resources.

As previously noted, the exceptional economic cost of a successful attack on aviation makes these assets an attractive target for terrorists. Additionally, the fact that by 2008 counter-terrorism spending had increased by \$15 billion over conventional counter threat spending on all other crime and the economic impact this spending has on the United States, should not be ignored.<sup>23</sup> This type of impact is precisely what Al Qaeda seeks. To this point, Al Qaeda stated in November 2010 in the third edition of *Inspire*

---

<sup>20</sup> U.S. Customs and Border Patrol Transportation Security Administration, *Air Cargo Advanced Screening Pilot Strategic Plan*, March 2012.

<sup>21</sup> Ibid.

<sup>22</sup> U.S. Government Accountability Office, *Aviation Security; TSA Has Taken Steps To Enhance Its Foreign Airport Assessments, but Opportunities Exist to Strengthen the Program* (GAO-12-163), Washington, DC: GPO, 2011.

<sup>23</sup> Veronique de Rugy, “The Economics of Homeland Security,” in *Terrorizing Ourselves: Why U.S. Counterterrorism Policy Is Failing and How to Fix It*, ed. Benjamin H. Friedman, Jim Harper, and Christopher A. Preble (Washington, DC: Cato Institute, 2010), 123.

magazine, “In terms of time it took us three months to plan and execute the operation from beginning to end. On the other hand this supposedly ‘foiled plot’, as some of our enemies would like to call it, will without a doubt cost America and other Western countries billions of dollars in new security measures.”<sup>24</sup> In the years following the attacks on 9/11 TSA implemented a layered approach to aviation security, which includes 21 different layers depicted below that were designed to detect and deter a successful terrorist attack on an aircraft.

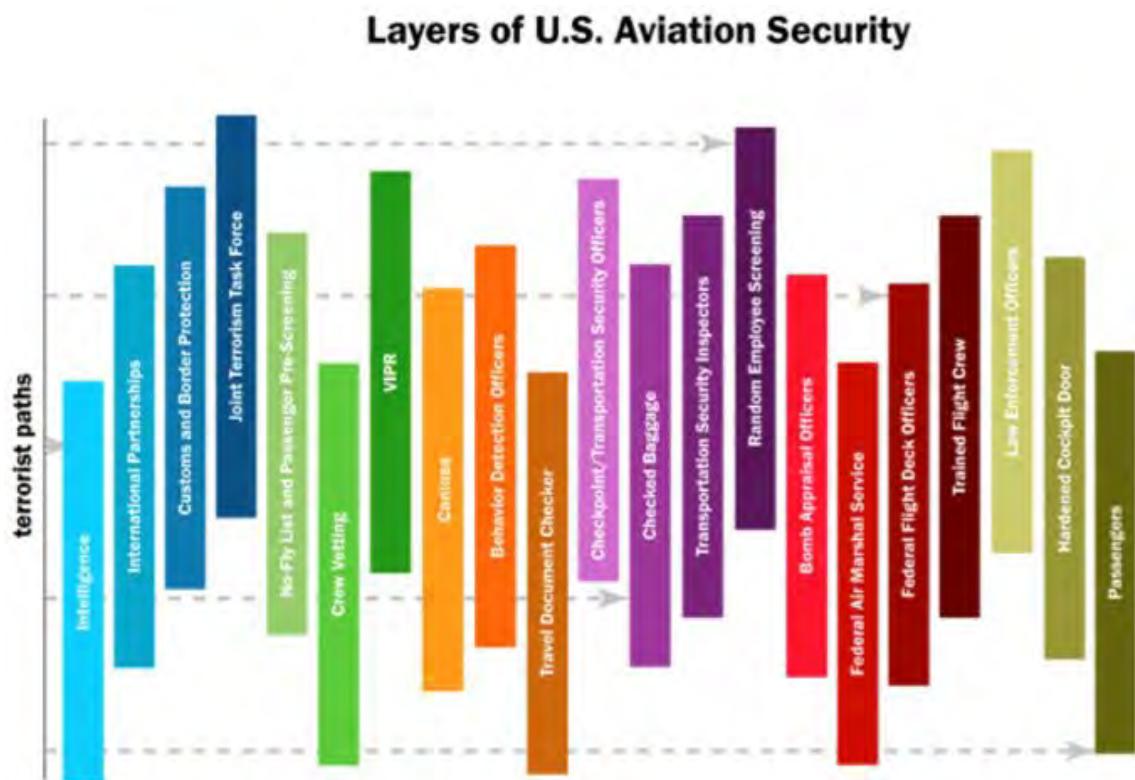


Figure 1. Layers of U.S. Aviation Security<sup>25</sup>

In the 11 years since the attacks of September 11, 2001, private industry, the FAA, and the TSA have attempted to procure a technological or develop a regulatory solution to the threat of an IED on an airplane. In his opening remarks to Congress,

<sup>24</sup> Al-Malaham Media, “Special Issue,” *Inspire Magazine* no. 3 (November 2010), [http://ia600304.us.archive.org/28/items/INSPIRE\\_ISSUE\\_3/special.pdf](http://ia600304.us.archive.org/28/items/INSPIRE_ISSUE_3/special.pdf).

<sup>25</sup> Transportation Security Administration, “Layers of Security” n.d., <http://www.tsa.gov/about-tsa/layers-security>.

Stephen M. Lord, the Director of Homeland Security and Justice Issues from the GAO, stated, “In the almost 10 years that have passed since TSA assumed responsibility for aviation security, TSA has spent billions of dollars and implemented a wide range of initiatives to strengthen the layers of aviation security. However, risks to the aviation system remain.”<sup>26</sup> Numerous protocols, regulations, and detection equipment have been deployed with the intention of mitigating this threat. Despite the significant investment of time and money, to date, none of these solutions has been completely successful, as evidenced by the successful IED attack perpetrated by AQAP on October 28, 2010. While combining the capabilities and administrative authorities of the TSA and CBP is a good start, the inability of these agencies to capitalize on and leverage the data they already possess to improve the current system by applying a risk-based intelligence driven air cargo protocol needs to be addressed.

## B. RESEARCH QUESTIONS

The primary question this thesis addressed is, can a multi-layered, intelligence-driven air cargo security protocol be developed from existing programs to decrease the threat posed by a cargo-borne incendiary or IED?

In addition, this thesis considered the following questions: How can the TSA in collaboration with CBP better apply risk categories to the international air cargo screening requirements to decrease the probability of a successful terrorist attack on air cargo? Which programs are suited to this collaboration; which systems create unnecessary redundancies, and do new programs need to be established?

This thesis attempted to confirm the following suppositions.

- A risk-based international air cargo screening protocol provides the flexibility necessary to adjust to the changing threats and the technological advancements in the air cargo industry.

---

<sup>26</sup> U.S. Government Accountability Office, *Testimony Before the Subcommittee on National Security, Homeland Defense, and Foreign Operations, Committee on Oversight and Government Reform, House of Representatives, Aviation Security, TSA Has Taken Actions to Improve Security, but Additional Efforts Remain, Statement of Stephen M. Lord, Director Homeland Security and Justice Issues* (GAO-11-807T), 2011, <http://www.gao.gov/products/GAO-11-807T>.

- A risk-based international air cargo screening protocol will provide the adaptability necessary to adjust to the threat environment based on the associated risks rather than treating all threat environments as equal.
- A risk-based international air cargo screening protocol will provide a sustainable security process while simultaneously meeting the needs of the air cargo industry.

### C. RESEARCH METHOD

This thesis is a policy analysis project. According to Bardach, policy analysis contains eight steps, which include defining the problem, assembling evidence, constructing alternatives, and selecting evaluation criteria, projecting the outcomes and confronting the tradeoffs, and determining the best course of action. This project is based upon and uses the methodological framework established by Bardach.<sup>27</sup> The policies being researched and evaluated are the congressionally mandated 100 percent international air cargo screening requirement, the European Union (EU) regulatory framework as applied to the implementation of EU regulation 1082/2012Y in respect to aviation security validations and the proposed risk-based intelligence driven international air cargo screening protocol. The specific aspects of those polices researched are the availability and reliability of data and intelligence, jurisdictional hurdles for implementation and enforcement, the measurement and application of risk, as well as the government and industry incurred cost.

The criteria used to analyze and develop recommendations for each of these polices researched were selected after a review of the available industry and government literature and testimony. The literature and available industry and government testimony determined the path of the research as previous polices, recommendations, and proposed solutions to the threat of explosives on aircraft were analyzed over the two and a half decades preceding the successful air cargo attack in 2010.

The research was broken into three sections. The first section evaluated the data and literature as it pertains to the pre-9/11 period of aviation security with an emphasis on the period after an IED attack on Pan Am flight 103. This period of time provides insight

---

<sup>27</sup> Eugene Bardach, *A Practical Guide for Policy Analysis* (Washington, DC: CQ Press College, 2011).

into the evolving threat of terrorism and terrorist organizations' emphasis on aviation attacks. During this period, the Gore commission and the associated GAO reports identified many of the jurisdictional and cost challenges faced by the FAA for implementing international aviation security. These challenges primarily focused on the jurisdictional conflicts, implementation costs, the unpredictability of terrorist attacks, and the lack of actionable intelligence. These limitations were used as a means of framing the research and served as means of evaluating the practicality of implementing each of the three processes. The two consecutive periods of research included the post-9/11 period and the time frame after the successful air cargo attack in October 2010. Aviation security was continuously evolving during each of the periods, and the policies and practices implemented were evaluated. At the conclusion of this policy evaluation, a clear understanding of the issues and problems related to the application of a 100 percent international air cargo screening protocol was achieved and an alternative solution was developed.

#### **D. CHAPTER OVERVIEW**

As outlined in Chapter I, the introductory chapter, the focus of this thesis was to explore the feasibility of continuing the 100 percent air cargo screening protocols as required by Congress, and inversely, exploring the possibility that a risk-based intelligence driven process could be established from existing programs that would increase the resiliency and sustainability of international air cargo security.

Chapter II provides an overview of the gaps in the international air cargo security practices, and the necessity for the creation of a risk-based intelligence driven air cargo screening protocol. This chapter additionally examines what has worked and what has not worked as a means of mitigating this threat to date.

Chapter III provides a review of literature related to the international air cargo environment. This chapter establishes the basis for understanding the literature and research that has been generated based on three periods of emphasis. These three periods include the pre-9/11 literature as it relates to international air cargo, the post-9/11

literatures, and the literature that has been written since the printer toner attacks that occurred in October 2010.

Chapter IV discusses and evaluates the U.S. international air cargo security protocols, as well as the EU international air cargo protocols, and the use and availability of air cargo data and intelligence and its limitations.

Chapter V discusses and evaluates the jurisdictional hurdles faced by each of the three systems. Each system is evaluated according to the legal authority the administrating agency has to implement and enforce the applicable security processes.

Chapter VI evaluates the costs associated with the implementation of the United States 100 percent air cargo security screening requirement, the EU implementation of EU regulation 1082/2012, and the application costs associated with the proposed risk-based intelligence driven air cargo security protocol. This chapter discusses and evaluates the cost to industry and government.

Chapter VII provides an outline of the proposed policy changes and their implementation in international air cargo security systems. This chapter discusses the plausibility, process, and benefits of instituting the proposed policy changes, particularly in contrast to those aspects of the congressionally mandated 100 percent air cargo screening process. This chapter concludes with a discussion of the limitations of the research.

**THIS PAGE INTENTIONALLY LEFT BLANK**

## II CHALLENGES

### A. AIR CARGO GAP ANALYSIS

As previously discussed, both industry and government have been unable to find a suitable solution to the threat of an IED attack on the aviation industry. In particular, preventing an IED attack using air cargo has been a acutely difficult problem to solve. This difficulty was underlined by the successful air cargo attack and the medias focus on the United States failure to close known security gaps as highlighted by the article by Nick McMaster in Figure 2. As a result of the lack of an efficient process to secure air cargo, Congress implemented the 100 percent air cargo screening mandate. While this mandate was well intentioned and the steps taken to attempt to implement it have improved air cargo security, the unintended fiscal consequences and jurisdictional gaps of the mandate currently make implementation impractical if not impossible. This chapter evaluates the procedures and programs that have been developed, as well as the gaps that continue to exist.



### **US Knew of, Didn't Close Air Cargo Security Gaps**

Nov 9, 2010 7:48 AM CST

Figure 2. Cargo Bomb Was Set to Blow Up over the United States<sup>28</sup>

---

<sup>28</sup> Nick McMaster, “Cargo Bomb Was Set to Blow Up Over US,” November 10, 2010, <http://www.newser.com/tag/55738/1/cargo-bombs.html>.

In the 17 years since the discovery of the Bojinka plot, private industry, the FAA, and now the TSA, have consistently attempted to develop a technological or procedural solution to the threat of an IED on an airplane. In a 2011 GAO report, Stephen Lord, the Director of Homeland Security and Justice Issues, is quoted as saying, “In the almost 10 years that have passed since TSA assumed responsibility for aviation security, TSA has spent billions of dollars and implemented a wide range of initiatives to strengthen the layers of aviation security. However, risks to the aviation system remain.”<sup>29</sup> Numerous protocols, regulations and detection equipment have been deployed with the intention of mitigating this threat. Of note is the most recent iteration in the governmental quest for a regulatory solution to the air cargo vulnerability. In 2007, Congress passed the ATSA, a portion of which seeks to address the air cargo screening vulnerability by mandating the implementation of the 100 percent air cargo screening initiative. This initiative requires that all cargo placed on passenger aircraft must receive the same level of screening to which passengers and baggage are subject. Despite the significant investment of time and money, none of these solutions, to include the 100 percent air cargo-screening requirement, have been completely successful.

The greatest air cargo vulnerability remains the inability to extend the TSA and CBP’s administrative authority beyond the U.S. border effectively to mitigate the benefits that an effective and regulated 100 percent air cargo-screening protocol would create. Each agency’s regulatory capabilities, while sufficient for domestic enforcement, fall short of what would be required to enforce administrative screening requirements in foreign nations. Charles Dent noted in his 2010 testimony before Congress, “TSA has no clear plan in place to address foreign in-bound cargo, thought the law requires it. Why is that? Not for a lack of effort, but because of a lack of authority.”<sup>30</sup> This weakness, which has been exploited by narcotics, human and counterfeit merchandise smugglers for centuries, remains the weakest link in the air cargo transportation chain. The TSA and

---

<sup>29</sup> U.S. Government Accountability Office, “Testimony Before the Subcommittee on National Security, Homeland Defense, and Foreign Operations, Committee on Oversight and Government Reform, House of Representatives,” Aviation Security, TSA Has Taken Actions to Improve Security, but Additional Efforts Remain Statement of Stephen M. Lord, Director Homeland Security and Justice Issues.”

<sup>30</sup> Dent, “100 Percent Air Cargo Screening: Remaining Steps to Secure Passenger Aircraft, Hearing before the Subcommittee on Transportation Security and Infrastructure Protection.”

CBP continue to seek administrative solutions to air cargo screening problems that reach beyond the authority granted to each of these agencies. Additionally, the congressionally imposed requirement for the TSA to screen 100 percent of air cargo is equally unenforceable or attainable. Dent stated in 2010 that the “success of a 100 percent screening requirement will depend in part on an effective inspection and enforcement program—we cannot simply impose a requirement and declare victory.”<sup>31</sup> Unfortunately, because the administrative and regulatory authority of CBP and the TSA ends at the U.S. border, a 100 percent screening protocol is conceptually ineffective.

A significant amount of research has been conducted at the industry and government levels, but academia has not yet attempted to conduct a complete analysis of the three decades’ worth of data available.

---

<sup>31</sup> Dent, “100 Percent Air Cargo Screening: Remaining Steps to Secure Passenger Aircraft, Hearing before the Subcommittee on Transportation Security and Infrastructure Protection.”

THIS PAGE INTENTIONALLY LEFT BLANK

### III. LITERATURE REVIEW

It is generally agreed among industry and government subject matter experts that the international air cargo supply chain remains vulnerable despite the 30-year pursuit for an answer to this aviation security gap. This is illustrated by the below figure which depicts a small portion of the numerous stakeholders involved in the air cargo security enterprise.



Figure 3. Air Cargo Environment Overview<sup>32</sup>

Legislative measures, international agreements, and technological solutions have been sought and unsuccessfully applied to this problem. Much of the research conducted in response to this weakness has come from government sources, such as the GAO, Congressional Research Service (CRS), and the Department of Homeland Security Office of the Inspector General (DHS/OIG). The Congressional Committee on Homeland Security has held hearings and received testimony from industry and agency leaders on air cargo screening. The scope of this literature review includes documents that pertain to air cargo security during the pre-9/11, the post-/911, and the post-10/29 AQAP printer toner attack.

The pre-9/11 literature includes Ramsey Yousef's Bojinka plot, in which the radical Islamist was able to design and test an explosive device capable of evading detection during the passenger screening process. The intended use of this device was to conduct a coordinated attack on U.S. flagged passenger air carriers that would destroy 10 passenger aircraft as they were flown over the Pacific Ocean while traveling to the United States. This period additionally includes the Libyan sanctioned terrorist attack on Pan Am

<sup>32</sup> Transportation Security Administration, "Air Cargo, Office of Security Policy and Industry Engagement," last revised January 9, 2013, <http://www.tsa.gov/stakeholders/air-cargo>.

flight 103, which was destroyed by an explosive device secreted within the baggage hold of the aircraft. These two attacks were the focus of the 1996 Gore Commission's report and findings on aviation security for the core of the decade's worth of available literature on the subject of aviation security.

The second period of study covers the post-9/11 literature developed in response to the hijacking and subsequent destruction of four U.S. flagged air carriers. While air cargo security is discussed during this period, it is ancillary to the discussion of passenger screening and anti-hijacking technologies, techniques, and counter measures. The predominate theory during this 10-year period was that terrorists would attempt to either hijack an all-air-cargo aircraft as a means of recreating the 9/11 attacks, or that terrorists would attempt to smuggle an IED onto an air passenger carrier as was seen during the 2006 liquid bomb plot, and the 2009 Christmas day attempted underwear bombing.

The third period of review covers the literature created after the Yemen printer toner attack disrupted by Saudi Arabian intelligence on October 28, 2010. It is during this three-year period that a significant shift is seen in the aviation security literature with a renewed emphasis towards the screening of domestic and international air cargo. It is in the post printer toner attack period that the 100 percent air cargo screening protocol was created by Congress with the intention of improving aviation security. Much of the literature during this time frame discusses implementation deadlines, as well as technical and operational obstacles to successful implementation.

A search for the available literature was conducted using the search terms aviation security, air cargo, air cargo security, and international air cargo security along with risk and risk mitigation. This search resulted in the discovery of a significant amount of government testimony, analysis, and reports. These products include CRS and GAO reports, Congressional testimony and industry sponsored papers designed to analyze the air cargo industries' vulnerabilities and to seek and evaluate proposed solutions. Government and industry entities with a direct interest in air cargo security and its economic and operational impact produce the majority of the literature and research. The review has been organized according to three distinct historical periods corresponding to

terrorist activities that impacted the evolution of aviation security: the pre-9/11 period, the post-9/11 period, and the post-AQAP Printer Toner Air Cargo attack period.

## A. PRE-9/11 ATTACKS

### 1. International Air Cargo

The available literature and studies are primarily government sponsored and congressionally mandated analysis. They show a consistent understanding of the urgency of the problem and the necessity to address these vulnerabilities. What the pre-9/11 literature lacks is a comprehensive solution to the risk posed by international air cargo carried on all cargo and all passenger aircraft. While the government experts and committees were consistently able to point to flaws in the system and the necessity to ensure these vulnerabilities are addressed, a comprehensive solution to the problems that balanced the needs of industry and government were not presented primarily because of the lack of a specific and credible threat to the industry. Additionally, the tremendous jurisdictional and implementation costs, which still exist today, made government and industry acceptance improbable.

GAO noted in 1994 that the FAA would need to balance regulatory oversight of the industry without impeding commerce or creating competitive complications to improve the nation's aviation security systems.<sup>33</sup> As a result, the FAA established the position of federal security manager at domestic category X airports and security liaison officers at international locations to serve as the FAA's representative to law enforcement, security and airport/airline managers. According to the air carriers, despite the FAA's attempt to balance commerce and security, the necessity for U.S. airlines to comply with the more stringent requirements imposed by the FAA while operating internationally, place a greater financial obligation on the U.S. carriers and puts them at a competitive disadvantage.<sup>34</sup> A 1990 study conducted by the Department of Transportation was unable to determine if the competitive disadvantage existed. Similarly,

---

<sup>33</sup> U.S. Government Accounting Office, *Aviation Security, Additional Actions Needed to Meet Domestic and International Challenges* (GAO/RCED-94-38), Washington, DC: GPO, January 1994, <http://www.gao.gov/products/RCED-94-38>.

<sup>34</sup> Ibid.

the FAA stated that it recognized that these differences existed and while they had not studied the subject, they did not believe a disadvantage existed.<sup>35</sup> The 1994 GAO report concluded that the introduction of new measures and technology in the coming decades must be done in a way that does not adversely affect commerce and the industry.<sup>36</sup> The GAO addressed several of the programs created in response to the Aviation Security Act of 1990 and focused a large part of its auditing efforts on cargo carried on passenger aircraft.<sup>37</sup> The GAO stated that the FAA had made progress in designing and implementing steps to identify airfreight forwarders as a means of improving air cargo security awareness, but The GAO also found that the FAA had not developed an inspection strategy to ensure regulatory compliance.<sup>38</sup> The GAO stated that the success of the freight forwarder program relied upon a robust and effective inspection process and that the lack of such a program created vulnerabilities.<sup>39</sup>

Two years after that report, Keith O. Fultz, the Assistant Comptroller General, Resources, Community and Economic Development Division, GAO, stated in his testimony before the Congressional Subcommittee on Aviation that the threat of a terrorist attack on American aviation had increased, and significant vulnerabilities to the system continued to exist both domestically and internationally.<sup>40</sup> Of note was the threat of the introduction of explosives to aircraft by passengers, baggage, mail, and cargo. At the time of this testimony, the FAA considered the introduction of explosives through checked baggage the greatest threat to aviation, the threat of unauthorized access to restricted areas of the airport and checked baggage being the next greatest threats. Fultz further noted that the ability to screen cargo and mail at airports was very difficult

---

<sup>35</sup> PolicyFutures, “Report of the Presidents Commissions on Aviation Security and Terrorism,” May 15, 1990, <http://www.policyfutures.com/PCAST/PCASTreport.pdf>, 34.

<sup>36</sup> Ibid.

<sup>37</sup> Ibid.

<sup>38</sup> Ibid.

<sup>39</sup> Ibid.

<sup>40</sup> U.S. General Accounting Office, *Testimony Before the Subcommittee on Aviation, Committee on Transportation and Infrastructure House of Representatives, Aviation Security, Urgent Issues Need to Be Addressed, Statement of Keith O. Fultz, Assistant Comptroller General, Resources, Community, and Economic Development Division* (GAO/T-RCED/NSAID-96-251), Washington, DC: GPO, 1996.

because of the size and scope of the system and the unpredictability of terrorism. Fultz raised two questions during his testimony, whether aviation security should be considered an issue of national security, and who should be responsible for paying for the costs associated with enhancing the air security process.<sup>41</sup> Fultz further discussed technological capabilities in his testimony to the Congressional Committee on Science and again noted the urgent need for the FAA, intelligence communities, and industry representatives to decide what actions needed to be taken and who would pay for it.<sup>42</sup>

## 2. Pre-9/11 Risk

Prior to the attacks on 9/11, the federal government and private industry were using risk and vulnerability assessments as a means of allocating limited resources to sectors that faced the greatest probability of attack or failure. In 1988, the GAO reported on several acts that Congress had passed as compared to the practices of several private industries.<sup>43</sup> Several challenges were noted, two of which focused on the intelligence community, specifically, the inability of the intelligence community to share valid and specific intelligence to end users who would then be able to adjust their security posture to limit the risk associated with the threat.<sup>44</sup> The report additionally focused on the difficulty associated with the necessity of both industry and government to provide a thorough evaluation of large sectors whose scope, magnitude, and complexity made such comprehensive evaluations difficult if not impossible to validate.<sup>45</sup>

The FAA Reauthorization Act of 1996 (Public Law 104-264), established the requirement for the FAA and Federal Bureau of Investigations (FBI) to conduct Joint Vulnerability Assessments (JVA) with the intent of measuring each airport's

---

<sup>41</sup> U.S. General Accounting Office, *Testimony Before the Subcommittee on Aviation, Committee on Transportation and Infrastructure House of Representatives, Aviation Security, Urgent Issues Need to Be Addressed, Statement of Keith O. Fultz, Assistant Comptroller General, Resources, Community, and Economic Development Division.*

<sup>42</sup> Ibid.

<sup>43</sup> U.S. General Accounting Office, *Report to Congressional Requesters, Combating Terrorism, Threat and Risk Assessments Can Help Prioritize and Target Program Investments* (NSIAD-98-74), Washington, DC: GPO, April 1998.

<sup>44</sup> Ibid.

<sup>45</sup> Ibid.

vulnerabilities and level of risk.<sup>46</sup> Each risk assessment evaluated proposed scenarios that the intelligence communities could validate or determine as unlikely based on available domestic and foreign intelligence. The teams used to conduct these JVAs consisted of risk, security, and vulnerability subject matter experts and were employees of the FBI and FAA.

In contrast to the government process, the private industries interviewed for the report conduct tri-annual assessments using teams of experts, of which no more than 25 percent could be experts in security. The industries' stated intention of limiting the number of security experts to 25 percent was to ensure that a diverse assessment, which focused beyond the security vulnerabilities, was created that would better identify the unpredictable risks a team of security experts would not see.

In 1998, the GAO conducted a comparative analysis of the private sector's five-step risk assessment process to the joint FAA and FBI system as was mandated by the Federal Aviation Reauthorization Act of 1996. While the joint FAA and FBI system relied on an annual evaluation and assessment of the vulnerabilities of category X airports, it did not include an evaluation of the probability of such attacks successfully occurring.

As previously stated, the public sector oil company analyzed utilized a five-step process that included the following evaluation criteria.

1. Determine the value of assets and judge the consequences of the loss of those assets
2. Identify the threats and pair them with the assets
3. Identify the assets vulnerabilities
4. Determine risks through the application of scenarios
5. Identify actions as necessary that lead to risk reduction<sup>47</sup>

---

<sup>46</sup> U.S. General Accounting Office, *Report to Congressional Requesters, Combating Terrorism, Threat and Risk Assessments Can Help Prioritize and Target Program Investments*.

<sup>47</sup> Ibid.

In contrast to the manner in which the FAA and FBI conducted risk and threat assessments, the oil company gathered a diverse group of subject matter experts and identified vulnerabilities and actions to be taken to mitigate the risk the vulnerability created.<sup>48</sup>

The congressional budget for fiscal year 2001 for combating terrorism was set at \$11 billion.<sup>49</sup> This funding level was in a large part established through the evaluation of the industry and governmental vulnerabilities and the intent of known terrorist organizations. While the intent of a terrorist organization is a reasonable indicator of a risk, the GAO report established the capability of the terrorist organization to conduct the intended attack as a better determinant of where perceived versus actual risks exist.<sup>50</sup> In 2000, federal efforts were focused on vulnerabilities rather than analyzing the credibility of the threat caused by the identified vulnerabilities. In 2000, the intelligence communities assessed that explosives and firearms were the preferred weapons of terrorists and posed the greatest risk. Since these assessments were the tools used for prioritizing the government's counter-terrorism investments, in 2001, the government focused on these threats.<sup>51</sup>

In contrast to the manner in which the United States establishes vulnerabilities and risk, the GAO evaluated five foreign countries policies and practices for establishing risk and allocating limited resources. These countries included in the report were Canada, France, Germany, Israel, and the United Kingdom. The GAO found in report NSAID-00-85, that the countries studied allocated their resources based on the likelihood of threats becoming attacks based on the available intelligence. Unlike in the United States, the intelligence communities of the five countries evaluated would continuously assess the

---

<sup>48</sup> U.S. General Accounting Office, *Report to Congressional Requesters, Combating Terrorism, Threat and Risk Assessments Can Help Prioritize and Target Program Investments*.

<sup>49</sup> U.S. General Accounting Office, *Testimony Before the Subcommittee on National Security, Veterans Affairs, and International Relations, Committee on Government Reform, House of Representatives, Combating Terrorism, Linking Threats to Strategies and Resources Statement of Norman J. Rabkin, Director National Security Preparedness Issues National Security and International Affairs Division (GAO/NSIAD-00-218)*, Washington, DC: GPO, 2000.

<sup>50</sup> Ibid.

<sup>51</sup> Ibid.

threats to determine which ones posed the greatest risk-based on the probability of them occurring. The countries would then assign assets to counter the risk from sectors at a lesser risk of attack by having used the risk and threat assessments as a means of prioritizing budgetary allocations.<sup>52</sup>

## B. POST-9/11 ATTACKS

### 1. International Air Cargo

Since the attacks on September 11, 2001, groups within the U.S. government have completed numerous reports and evaluations of the existing vulnerabilities in the aviation security and the air cargo supply chain. The GAO (2002) provided testimony before the U.S. Senate Committee on Commerce, Science and Transportation outlining the immediate and long-term challenges that the TSA would face while preparing to secure the nation's transportation systems. Dr. Gerald L. Dillinham, the Director of Physical Infrastructure Issues, GAO noted during his testimony that securing the nation's aviation systems would be a difficult task, in particular, the need to meet mandated deadlines while creating a federal agency.<sup>53</sup> At the time of his testimony in 2002, two bills designed to address identified deficiencies in the air cargo supply chain, S. 2656 and S. 2668, were pending ratification by the U.S. Senate. S. 2656 required the head of the TSA to establish a security plan for the transportation of cargo in and out of the United States. S. 2668 required the head of the TSA to establish a system to screen cargo in all passenger and cargo aircraft. Neither bill came to the floor for a vote, but rather, each was read and referred to the Committee on Commerce, Science and Transportation for further discussion.

According to the 2002 GAO report on Vulnerabilities and Potential Improvements for the Air Cargo System of 2002, the FAA and TSA failed to develop a comprehensive plan for eliminating vulnerabilities in the air cargo system as had been identified and

---

<sup>52</sup> U.S. General Accounting Office, *Report to Congressional Requesters, Combating Terrorism, How Five Foreign Countries Are Organized to Combat Terrorism* (GAO/NSIAD-00-85), Washington, DC: GPO, 2000.

<sup>53</sup> U.S. General Accounting Office, *Report to Congressional Requesters, Aviation Security, Vulnerabilities and Potential Improvements for the Air Cargo System*.

recommended by the 1990 Gore Commission.<sup>54</sup> The failure of the TSA to identify and eliminate these vulnerabilities had the potential to threaten the air transport system. The TSA's focus on securing passenger and baggage screening was identified as a significant contributing factor for this failure. The GAO noted that while the TSA had made progress in passenger and baggage screening, it had failed to develop a comprehensive plan and long-term goals for air cargo security.<sup>55</sup>

The TSA and CBP released the Air Cargo Strategic Plan in 2003, which was designed to provide a road map for both agencies to implement threat-based, risk-managed strategies to the air cargo environment.<sup>56</sup> The TSA and CBP stated that the release of the plan was intended to address issues raised in the GAO report of December 2002 and the Department of Transportation's Office of the Inspector General report from September 2002. Despite developing an air cargo security plan designed to manage the various risks in the air cargo environment, the TSA also acknowledged that successfully accomplishing such a task would be difficult.<sup>57</sup>

As noted by the GAO in 2005, the TSA had begun to take steps towards securing the air cargo supply chain by applying a risk-based strategy to assess vulnerabilities by beginning to focus on two specific air cargo threats. The threats identified were the possible introduction of an explosive device on a passenger aircraft and the hijacking of an all-cargo aircraft. These priorities were consistent with TSA's 2003 Air Cargo Strategic Plan. Some air cargo industry leaders agreed with the TSA's use of the two identified threats, but other air cargo specialist noted that a gap existed in the air cargo threat assessment outlined in the Air Cargo Strategic Plan. Specifically, the industry stakeholders were concerned with the failure of the TSA to recognize the threat of an

---

<sup>54</sup> U.S. General Accounting Office, *Report to Congressional Requesters, Aviation Security, Vulnerabilities and Potential Improvements for the Air Cargo System*.

<sup>55</sup> Ibid.

<sup>56</sup> Transportation Security Administration, "Air Cargo Strategic Plan," November 2003, [http://www.tsa.gov/public/interapp/press\\_release/press\\_release\\_0371.xml](http://www.tsa.gov/public/interapp/press_release/press_release_0371.xml).

<sup>57</sup> Ibid.

explosive device being placed on an all-cargo aircraft.<sup>58</sup> The TSA addressed these concerns with the GAO in 2005 by stating, “TSA decided to focus on the two threats cited above because they are the most likely to occur.”<sup>59</sup>

A report to Congress by the CRS in 2007 noted that the air cargo system continued to be vulnerable to terrorist plots involving the placement of explosives in passenger and all cargo aircraft. The 110th Congress clarified the processes required to properly screen air cargo in the *Implementing the 9/11 Commission Recommendations Act of 2007* (H.R.1). Specifically, the act required 100 percent of air passenger cargo be screened with the equivalent process used to screen passengers and checked baggage. Industry stakeholders and leaders argued that this provision was not a practical solution and that it would present significant costs and challenges for the air cargo industry. David Wirsing of the Airforwarders Association stated that the cost would be “over 700 million dollars in the first year alone,” while TSA spokeswoman Andrea McCauley placed the 10-year cost estimate at \$3.6 billion.<sup>60</sup> A subsequent CRS analysis placed the cost at \$3.75 billion over the same decade.<sup>61</sup>

In 2007, the Homeland Security Council (HSC) published the National Strategy for Homeland Security in which it described the possibility of terrorist agents exploiting the global supply chain to smuggle weapons of mass destruction into the United States and create catastrophic events. GAO highlighted in 2007 that the two agencies responsible for the security of international air cargo, the TSA and CBP, had begun to implement inbound air cargo security protocols, but also noted that CBP and the TSA had failed to establish goals and time frames for fully implementing the processes. Of particular note in the GAO report was the failure of the TSA and CBP to establish open communication regarding each agency’s air cargo security efforts, intelligence and

---

<sup>58</sup> U.S. Government Accountability Office, *Report to Congressional Requesters, Aviation Security, Federal Action Needed to Strengthen Domestic Air Cargo Security* (GAO-06-76), Washington, DC: GPO, 2005, 21. <http://www.gao.gov/products/GAO-06-76>.

<sup>59</sup> Ibid.

<sup>60</sup> Bart Elias, *Air Cargo Security*, CRS Report RL32022 (Washington, DC: Library of Congress, Congressional Research Service, July 30, 2007), <http://www.fas.org/sgp/crs/homesec/RL32022.pdf>.

<sup>61</sup> Ibid.

technology developments. The GAO supported this view, which noted that TSA officials acknowledged that vulnerabilities continued to exist in both the international and domestic air cargo supply chains, and that the TSA did not have the necessary screening and compliance resources needed to eliminate these supply chain vulnerabilities.<sup>62</sup>

The GAO noted in 2008 that while the TSA had made progress in securing the air cargo supply chain, programs that had been developed to ease the burden on the shipping industry had created new vulnerabilities within the air cargo supply chain. It was noted that the TSA had sought to balance the need for commerce and security by providing industry-screening exemptions in the domestic and international air cargo processing.<sup>63</sup> The TSA stated that it used a threat and vulnerability assessment to determine which cargo to exempt, but the GAO stated that the TSA had a limited ability to make realistic risk-based exemptions and doing so increased vulnerabilities in the air cargo supply chain. According to a 2009 DHS/OIG report, programs developed by the TSA to prevent the terrorist and criminal exploitation of the air cargo security supply chain, such as the Known Shipper Program (KSP), had failed.<sup>64</sup> This evaluation was supported by DHS/OIG, which conducted an audit of the KSP and the Known Shipper Management System (KSMS), and found that significant technical and procedural issues remained within the systems, and that these issues created unnecessary vulnerabilities within the domestic and international air cargo supply chain.<sup>65</sup>

In September 2010, the DHS/OIG published an unclassified summary of the TSA procedures for screening air cargo on passenger aircraft. The DHS/OIG spoke to the strengths and weaknesses of the explosive trace detection, X-ray, physical search, and

---

<sup>62</sup> U.S. Government Accountability Office, *Testimony before the Subcommittee on Transportation Security and Infrastructure Protection, Committee on Homeland Security, House of Representatives*, Aviation Security, Transportation Security Administration May Face Resource and Other Challenges in Developing a System to Screen All Cargo Transported on Passenger Aircraft, Statement of Cathleen A. Berrick, Director Homeland Security and Justice Issues (GAO-08-959T), Washington, DC: GPO, 2008, <http://www.gao.gov/products/GAO-08-959T.pdf>.

<sup>63</sup> Ibid.

<sup>64</sup> Department of Homeland Security, Office of Inspector General, *Transportation Security Administration's Known Shipper Program* (DHS/OIG-09-35), Washington, DC: U.S. Department of Homeland Security, March 2009, [http://www.oig.dhs.gov/assets/Mgmt/OIGr\\_09-35\\_Mar09.pdf](http://www.oig.dhs.gov/assets/Mgmt/OIGr_09-35_Mar09.pdf).

<sup>65</sup> Ibid.

TSA-certified canine teams. The DHS/OIG also provided the TSA with a list of the vulnerabilities that the audit had detected and that TSA acknowledged that weaknesses in the global air cargo supply chain continue to exist.<sup>66</sup>

## 2. Post-9/11 Risk

In the post-9/11 records dealing with risk, three elements have become a part of the evolution of the risk equation. In GAO-02-150T, the tools for measuring these elements were identified as threat assessments, vulnerability assessments, and criticality assessments. The predominant thought in the post 9/11 world was that while risk cannot be eliminated, it can be reduced and each assessment provided an opportunity to measure risk. Vulnerability assessments are used to identify weaknesses, criticality assessments, identify assets, and threat assessments measure the intent and capability of nefarious operators.<sup>67</sup>

In February 2007, CRS documented the evolution of the DHS risk measuring methodology beginning with 2002 in report RL33858. At the start of this evolution, a maturing of the risk evaluation process, and subsequently, the equation, is beginning to be seen. Initially, the risk equation determined that  $R$  (risk) =  $P$  (population).<sup>68</sup> Over time, as the risk assessment process matured, the equation began to contain more variables. In 2004–2005, the risk equation became  $R = T + CI + PD$  (threat + critical infrastructure + population density).<sup>69</sup> It further evolved through 2007 to become the now familiar  $R = T \times V \times C$  (vulnerability  $\times$  consequence).<sup>70</sup> The application of “geographically-based risk” is discussed during this period as well. Geographically based

---

<sup>66</sup> Department of Homeland Security, Office of Inspector General, *Evaluation of Screening of Air Cargo Transported on Passenger Aircraft* (DHS/OIG10–119), Washington, DC: U.S. Department of Homeland Security, September 2010, [http://www.oig.dhs.gov/assets/Mgmt/OIG\\_10-119\\_Sep10.pdf](http://www.oig.dhs.gov/assets/Mgmt/OIG_10-119_Sep10.pdf).

<sup>67</sup> U.S. General Accounting Office, *Testimony Before the Subcommittee on National Security, Veterans Affairs, and International Relations, Homeland Security, Key Elements of a Risk Management Approach Statement of Raymond J. Decker, Director Defense Capabilities and Management House Committee on Government Reform* (GAO-02–150T), Washington, DC: GPO, 2001.

<sup>68</sup> Todd Masse, Siobhan O’Neil, and John Rollins, *The Department of Homeland Security’s Risk Assessment Methodology: Evolution, Issues, and Options for Congress*, CRS RL33858 (Washington, DC: Library of Congress, Congressional Research Service, February 2, 2007).

<sup>69</sup> Ibid.

<sup>70</sup> Ibid.

risk considers several characteristics, such as regionally reported threats, as well as law enforcement investigations and activity. In addition to these factors, geographically based risk analysis considers the vulnerability factors of the region and the impact of an attack on the area.<sup>71</sup> The CRS did note that despite the evolution of the risk equation, the value of the threat was limited to the available federal investigative and intelligence information.<sup>72</sup>

In his 2008 discussion paper, Robert Poole reviewed the application of risk models to aviation security, and concluded that at the time, the majority of the governmental risk-based discussions were simply rhetoric, stating, “much of the actual policy changes appear to have been driven by political imperatives to reassure frightened populations that air travel is still safe.”<sup>73</sup> Poole continued to note that since 2005, the TSA had made very few attempts to move to a risk-based approach to aviation security, and that the failure of the DHS and the TSA to establish or apply an integrated risk protocol had also been noted by the GAO in August 2007.<sup>74</sup> In his conclusion, Poole discussed the fact that most aviation security and safety policies are the results of attacks or accidents, and as such, do not seek solutions to possible future terrorist attacks.<sup>75</sup> In a RAND paper designed to evaluate the Department of Homeland Security as it approached its first change in executive power since its inception, Brian Jackson and David Frelinger noted that it was not possible to respond to all threats without causing unnecessary

---

<sup>71</sup> Masse, O’Neil, and Rollins, *The Department of Homeland Security’s Risk Assessment Methodology: Evolution, Issues, and Options for Congress*.

<sup>72</sup> Ibid.

<sup>73</sup> Robert W. Poole, *Toward Risk-Based Aviation Security Policy*, Joint Transportation Research Center, Discussion Paper 2008–23, November 2008.

<sup>74</sup> U.S. Government Accountability Office, *Testimony Before the Subcommittee on Transportation Security and Infrastructure Protection, Homeland Security Committee, House of Representatives* *Department of Homeland Security: Progress Report on Implementation of Mission and Management Principles in Homeland Security, Statement of Norman J. Rabkin, Managing Director, Homeland Security and Justice* (GAO-08-904T), Washington, DC: GPO, 2008.

<sup>75</sup> Poole, *Toward Risk-Based Aviation Security Policy*.

economic damage.<sup>76</sup> Instead, a cost effective and sustainable security model should be designed that does not ignore the novel risks and threats.<sup>77</sup>

## C. POST-PRINTER-TONER ATTACK

### 1. International Air Cargo

On October 29, 2010, an operative from AQAP delivered two packages containing explosive devices with timers to the UPS and FedEx processing centers in Yemen. Information provided by the Saudi Arabian intelligence service assisted in the detection of the devices before detonation.

In December 2010, the CRS published “Screening and Securing Air Cargo: Background Issues for Congress,” which highlights policies and processes that were being employed by the TSA and CBP. Of note were the TSA’s continued efforts to work with international partners to increase international air cargo screening and their continued inability to accomplish the congressionally mandated 100 percent air cargo-screening mandate. The CRS described several obstacles inhibiting the TSA’s ability to comply with the mandate. These obstacles included the lack of the regulatory authority to define foreign screening requirements, an inability to enforce screening requirements developed by the TSA, and a lack of industry support for the cost-ineffective 100 percent screening mandate. As a result, the TSA and CBP had begun to institute a risk-based inspection strategy.

In addition, the CRS noted that the *Implementing the 9/11 Commission Recommendations Act of 2007* had defined what processes would not qualify as air cargo screening, but failed to designate who was responsible for conducting the screening.<sup>78</sup> As a result, the TSA placed the requirement for conducting air cargo screening on the airlines, freight forwarders, shippers, manufacturers, and third party screening facilities.

---

<sup>76</sup> B. Jackson and D. Frelinger, *Emerging Threats and Security Planning, How Should We Decide What Hypothetical Threats to Worry About?*, RAND Corporation, 2009.

<sup>77</sup> Ibid.

<sup>78</sup> Bart Elias, *Screening and Securing Air Cargo: Background and Issues for Congress*, CRS R41515 (Washington, DC: Library of Congress, Congressional Research Service, December 2, 2010), [http://assets.opencrs.com/rpts/R41515\\_20101202.pdf](http://assets.opencrs.com/rpts/R41515_20101202.pdf).

The TSA cited a lack of assets available for conducting the screening operations as the reason for shifting the responsibility for screening. The GAO further supported this in 2011 while highlighting the TSA's failed efforts to conduct foreign all air cargo airport threat assessments. It was stated that the TSA was unable to establish reasonable goals and target completion dates for conducting threat assessments at the 17 air cargo international hubs due to the lack of the necessary TSA manpower, funding, and authority.

The DHS published the joint CBP/TSA Air Cargo Advanced Screening Pilot Strategic Plan in March 2012.<sup>79</sup> The strategic plan outlines the process proposed by CBP and the TSA to identify and screen high-risk air cargo shipments without impeding the flow of commerce. CBP and the TSA stated that the pilot process would establish a tiered six-stage implementation process with the intention of expanding the trusted shipper concept as a means of achieving the 100 percent air cargo-screening mandate. The GAO in 2012 reviewed the steps that the TSA had taken to address vulnerabilities to the air cargo supply chain.<sup>80</sup> The GAO found that vulnerabilities continued to exist in ACAS implementation due to regulatory limitations in the international air cargo environment. Additionally, screening vulnerabilities had been highlighted by the failure of the existing explosives detection technology to discover the devices used in the Yemen attack.

The GAO determined that the air cargo industry was unwilling to endure the disruptions in the supply chain caused by the rapid lifting of screening exemptions to cargo classes and that the TSA had not accounted for the necessity to allow time for the industry to adapt to the new processes and procedures. These changes additionally caused industry confusion about the appropriate screening process, which then caused lapses in air cargo screening protocols. The GAO noted that the TSA continued to encounter

---

<sup>79</sup> U.S. Department of Homeland Security, U.S. Customs and Border Protection Transportation Security Administration, "Air Cargo Advanced Screening Pilot Strategic Plan," March 2012, [http://www.cbp.gov/linkhandler/cgov/trade/cargo\\_security/cargo\\_control/acas\\_psplan.ctt/acas\\_psplan.pdf](http://www.cbp.gov/linkhandler/cgov/trade/cargo_security/cargo_control/acas_psplan.ctt/acas_psplan.pdf).

<sup>80</sup> U.S. Government Accountability Office, *Report to Congressional Requesters, Aviation Security: Actions Needed to Address Challenges and Potential Vulnerabilities Related to Securing Inbound Air Cargo* (GAO 12-632), Washington, DC: GPO, 2012, <http://www.gao.gov/assets/600/590789.pdf>.

challenges and obstacles to meeting the 100 percent air cargo screening protocol and had to postpone the implementation of the mandate continuously.

## **2. Post-Printer-Toner Attack Risk**

In 2012, the RAND Homeland Security and Defense Center conducted an independent assessment of the TSA's risk management analysis tool used to simulate terrorist behavior and the probability of successful attacks on the domestic commercial air system. RAND determined that the model is significantly dependent on identification, validation, and maintenance of the approximately 4,300 input valuations through the continued use of subject matter expert data, but despite this, the system was a significant improvement over the previously rudimentary system employed by the TSA.<sup>81</sup> RAND determined that the TSA needed to adopt risk evaluation policies capable of covering a broad range of evolving risks rather than creating programs that addressed singular threats.<sup>82</sup>

---

<sup>81</sup> RAND, Homeland Security and Defense Center, *Modeling Terrorism Risk to the Air Transportation System*, 2012.

<sup>82</sup> Ibid.

## IV. RISK

Risk analysis has played a role in the industry and governmental decision processes for a significant period of time. The application of risk models to air cargo screening protocols is a natural progression of the security industry as this nation moves further away from the attacks on 9/11. The necessity to employ the limited resources available to government and industry effectively and efficiently, as opposed to continuing the implementation the 100 percent air cargo screening protocol, requires the adoption of an intelligent risk-based process. The risk analysis and mitigation cycle includes five major components: Identify the risk, assess the risk, create a mitigation plan and implement the plan while ensuring clear communication. This chapter explores these options and the feasibility of applying the risk analysis and mitigation cycle as it would apply to the United States, the European Union, and the proposed air cargo screening policy.



Figure 4. Risk Analysis and Mitigation Cycle<sup>83</sup>

At the heart of this discussion is the failure of the 100 percent air cargo security requirement to consider the importance of including risk as a factor in the evaluation of the threat presented by international air cargo. Just as not all passengers present an equal risk to aircraft, not all air cargo poses an equal risk to aircraft. The TSA has recently

---

<sup>83</sup> Edaptive Computing Inc., “Risk Analysis and Mitigation, n.d., <http://www.edaptive.com/solutions/capabilities/riskmanagement.aspx>.

adopted Risk Based Passenger Screening through the implementation of initiatives designed to improve aviation security by concentrating security-screening efforts on those passengers who pose the greatest potential risk to the aviation industry, which has been accomplished through the adoption of several risk assessing programs. These programs include the highly publicized Pre✓, screening of active duty U.S. service members, managed inclusion and the over 75 and fewer than 12 provisions.<sup>84</sup> This chapter discusses the risk assessment processes, or the lack thereof, used in the United States and the European Union air cargo security environment used as a means of applying the appropriate security screening process to air cargo shipments.

Within the United States, domestic air cargo transported on passenger aircraft is required to be screened at a level commensurate with the level of screening provided to passenger baggage.<sup>85</sup> In accordance with the *Implementing Recommendations of the 9/11 Commission Act of 2007*, the 100 percent screening process for domestic cargo on passenger aircraft was to be completed by August 2010. To meet this requirement, the TSA implemented a multi-layered approach for the vetting and screening of domestic cargo shipments in the air cargo supply chain. Several programs were established or enhanced as a means of maximizing the reliability of this layered security approach. They include but are not limited to CCSP, Certified Cargo Screening Facility (CCSF), the Indirect Air Carrier (IAC) Program, the IAC Management System and the Know Shipper Program. These programs form the core of the TSA domestic air cargo security system.

The CCSP was created as a means of allowing industry to screen piece level cargo prior to its being delivered to the air carrier with the intent of meeting the 100 percent screening requirements, which was additionally done to accomplish the screening requirement without placing the entire responsibility on the air carriers who do not have the capacity to provide the appropriate level of screening to meet the mandate.<sup>86</sup> The CCSP is a voluntary program that allows the TSA to assess, validate, and regulate CCSFs

---

<sup>84</sup> Transportation Security Administration, “Risk-Based Security Initiatives,” n.d., <http://www.tsa.gov/traveler-information/risk-based-security-initiatives>.

<sup>85</sup> Transportation Security Administration, “The International Air Cargo Association,” May 2008, <http://www.hndl.org/?view&did=14323>.

<sup>86</sup> Transportation Security Administration, “Certified Cargo Screening Program.”

that will conduct air cargo screening prior to the cargo being delivered to the air carrier. The CCSF piece level screening allows screened and palletized cargo to be uploaded to passenger aircraft without further inspection unless risk-based or randomized screening is performed. The CCSP is regulated by the TSA. As such, the associated CCSF is subject to inspection by Transportation Security Inspectors-Cargo (TSI-C) who ensure regulatory and program compliance.

IACs are “engaged indirectly in the air transportation of property on aircraft” and are subject to TSA inspection at any time.<sup>87</sup> Additionally, the TSA uses the Indirect Air Carrier Management System (IACMS) to validate and approve existing and new IACs. The IACMS process was developed as a means for the TSA to gather pertinent information about IACs around the country and assists in the performance of Security Threat Assessments (STA) conducted on employees of the companies. The next security layer in the TSA air cargo security process is the KSMS created for shippers who did not want to become IACs. This security process allows known shippers based within the United States to be verified and certified as legitimate shippers by the TSA, which is accomplished after a systematic risk assessment and determination of legitimacy is made by the TSA. As of the third quarter of 2008, the TSA had processed 1.4 million shippers through the KSMS.

The TSA has resources within the domestic air cargo security regulatory framework as well. One of these programs includes the explosive detection canines employed in the air cargo security venue. These canines are employed specifically to clear bulk air cargo to be uploaded onto passenger aircraft at the nation’s busiest airports.<sup>88</sup> In addition to being trained as a canine officer, the handlers are fully certified transportation security inspectors capable of looking for regulatory violations.

The IAC Screening Technology Pilot is a pilot program available within the TSA, which is an initiative established as a means of allowing high volume air cargo

---

<sup>87</sup> U.S. Government Printing Office, *49 CFR—Part 1548 Indirect Air Carrier Security Section 1 Applicability*, 2010.

<sup>88</sup> Transportation Security Administration, “TSA Canine Program Enhances Air Cargo Security,” October 17, 2008, <http://www.tsa.gov/press/releases/2008/10/17/tsa-canine-program-enhances-air-cargo-security>.

transporters to test screening technology provided by the TSA in an air cargo environment as a means of gathering data on the technology's validity. While these security layers provide a robust system for the detection and deterrence of explosives in air cargo within the borders of the United States, they are incapable of providing a similar layer of security for inbound international air cargo.

The significant difference between the U.S. and the EU regulations is that the EU regulations state that allowances must be made for individual airports "in the light of the local risk assessment."<sup>89</sup> This statement is distinctly different from the federalized security system that has been implemented within the United States. Unlike the regulatory guidance provided by the European Union, the United States created an all hazards process that does not allow for distinctions between the varying levels of risk associated with conveyances, points of departure, or passenger and package threats.

---

<sup>89</sup> Official Journal of the European Union, "Commission Regulation (EC) No 622/2003 of 4 April 2003," 2003, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:089:0009:0010:EN:PDF>.

## **V. DATA AND INTELLIGENCE EVALUATION**

Data and intelligence gathering and evaluation are often the subject of public debate. The real and perceived abuses of private industry and government agencies and the privacy violations caused by these abuses make the discussion of expanding these types of programs difficult. While the illicit gathering of data is a real issue, this chapter looks to explore the feasibility and practicality of gathering and analyzing voluntarily supplied industry data and information.

The use of public and commercial shipping data and intelligence products as a means of mitigating risk has been the subject of debate from early on in aviation antiterrorism discussions. So much so that in 1990, the Aviation Security Improvement Act Congress established the necessity for the FBI and FAA to conduct joint vulnerability assessments at all the nation's largest airports as means of identifying vulnerabilities, and ultimately, as a vehicle for reducing risk by designing solutions to these vulnerabilities.<sup>90</sup> This chapter discusses the role of voluntarily provided shipping data and intelligence in the current U.S. domestic air cargo model, the EU air cargo model, and the proposed international air cargo model.

### **A. THE U.S. AIR CARGO SYSTEM**

The TSA is exclusively responsible for regulating the handling and security of domestic air cargo. As a means of accomplishing this task, it has implemented several programs that leverage data collection as a way of mitigating the threat of a domestic air cargo attack. As a part of this process, the TSA created a multi-layered data collection process that allows for the evaluation of parties interested in participating in the air cargo industry. While a majority of these data collection efforts relies on the voluntary submission of business and employee information, the ability to participate in the aviation industry is contingent on this voluntary data submission.

---

<sup>90</sup> U.S. Government Accounting Office, *Aviation Security, Additional Actions Needed to Meet Domestic and International Challenges*.

The first tier of data collection in this multi-layered system is the Indirect IAC program. This program allows those persons or entities within the United States who do not have a FAA air carrier certificate to indirectly participate in the transportation of property on passenger air carriers.<sup>91</sup> The IACMS and the KSMS support this program by validating new and existing IACs. This database allows companies to voluntary submit corporate and employee information, which is used to mitigate the threat of a terrorist attack by keeping potentially dangerous applicants and business owners out of the aviation industry. Specifically within the air cargo industry, this process is accomplished by conducting an aviation worker STA, as depicted in the below figure, for employees who want to be employed in the aviation industry by processing and shipping air cargo.

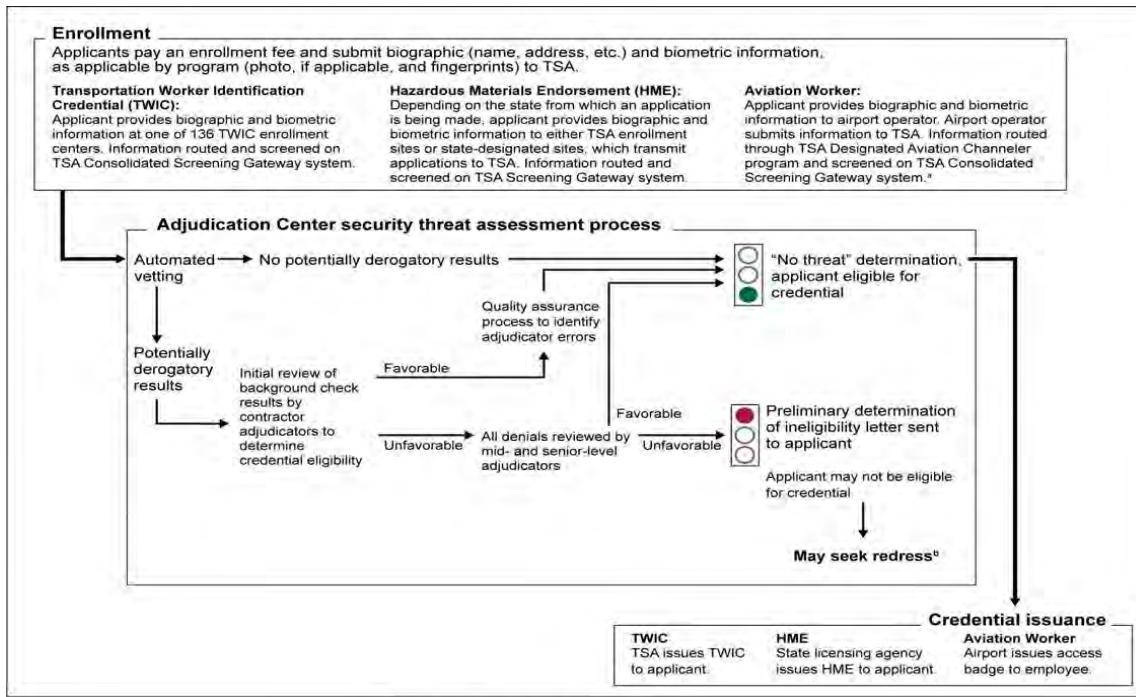


Figure 5. TSA Functions in Security Threat Assessment Process<sup>92</sup>

<sup>91</sup> Transportation Security Administration, “Frequently Asked Questions,” n.d., <http://www.tsa.gov/stakeholders/frequently-asked-questions-1>.

<sup>92</sup> U.S. Government Accountability Office, *Report to the Ranking Member, Committee on Homeland Security, House of Representatives, Transportation Security, Action Needed to Strengthen TSA’s Threat Security Assessment Process* (GAO-13-629), Washington, DC: GPO, 2013, <http://www.gao.gov/assets/660/656051.pdf>.

As an additional means of securing the air cargo industry, the KSMS was created. The KSMS system is a platform that again allows for the voluntary submission and collection of shipper information as a means of validating the legitimacy of a shipper. According to data provided by the TSA, as of the third quarter of 2008, the TSA had vetted 1.4 million shippers through the KSMS system.<sup>93</sup> A KSMS participant is granted the ability to deliver cargo for transport on an aircraft to a CCSP participant. The CCSP is required and able to verify the known shipper's information in the KSMS, and after having successfully verified the validity of the shipper, is then allowed to accept the shipment for security screening and eventual shipment on air passenger aircraft.

The TSA and its Office of Intelligence (TSA-OI) are responsible for the collection and appropriate dissemination of intelligence products to transportation stakeholders. While the TSA-OI does not gather intelligence, it does receive information from the Intelligence Community (IC) that it uses for threat analysis. The TSA-OI also gathers information from outside the IC. These information sources include components of DHS, local law enforcement agencies, as well as industry and transportation sector owners and operators.<sup>94</sup> The TSA-OI creates intelligence products shared throughout the transportation network as a means of improving domain and threat awareness. The TSA's regulatory division also uses these products, which is responsible for using the information for determining the necessity of instituting Security Directives (SD) to U.S. transportation system owners and operators as a means of mitigating risks in the transportation systems.

The TSA's multi-layered system of data collection, intelligence products, and threat assessments works well within the United States as a means of mitigating the risks associated with the transportation of domestic air cargo. Although the data collection is voluntary, it is necessary for companies and employees to provide the information if they wish to remain a competitive member of the shipping industry by using passenger carrying aircraft. Unfortunately, once cargo goes beyond the borders of the United States,

---

<sup>93</sup> Transportation Security Administration, "Frequently Asked Questions."

<sup>94</sup> Mark A. Randol, *The Department of Homeland Security Intelligence Enterprise, Operational Overview and Challenges for Congress*, CRS Report R40602 (Washington, DC: Library of Congress, Congressional Research Service, March 19, 2010), <http://www.fas.org/sgp/crs/homesec/R40602.pdf>.

the system becomes ineffective. Since the TSA does not have the jurisdictional authority to enforce the application of regulations by foreign nations and corporations, it is not capable of requiring the data collection and threat assessment requirements on international shipping corporations that transport air cargo until they enter the United States. Once an explosive device is placed on an American flagged aircraft, the multi-layered security system has failed. The TSA's inability to ensure the security of international air cargo was highlighted by the successful October 2010 AQAP attack printer toner attack.

## **B. THE EUROPEAN UNION AIR CARGO SYSTEM**

The goal of the EU regulations is to harmonize the security procedures applied to air cargo shipments throughout the European Union while minimizing the threat to EU citizens and trade. Similar to the U.S. domestic air cargo system, the European Union has created several categories of known and secure shippers as a means of ensuring the supply chains levels of security. While some of the processes differ from those applied within the United States, the multi-layered security framework used by the European Union nearly mirrors that of the United States.

The first portal available for air cargo and mail to enter into the secure supply chain is acceptance by an account consignor, an entity that serves as a gateway for packages prior to delivery to a known consignor. Account consignors must provide validated business information to the appropriate member state approving authority. Once accepted, account consignors are placed into a database and the businesses shipping activity is monitored to ensure the facility continues to process air cargo and mail consignments appropriately and regularly. If no activity occurs, the account consignor is removed from the database and prohibited from processing air cargo and mail consignments. As described in the EU air cargo security documents, “The EU security regime relating to air cargo is essentially based on two pillars; the secure supply chain and the security control of consignments.”<sup>95</sup>

---

<sup>95</sup> European Union, “European Commission-MEMO/10/545, Air Cargo Security,” May 11, 2010, [http://europa.eu/rapid/press-release\\_MEMO-10-545\\_en.htm](http://europa.eu/rapid/press-release_MEMO-10-545_en.htm).

The first layer of security placed over the airmail and cargo supply chain is the regulated agent, which is defined as “any entity that applies security controls as referred to in point 6.3.2.0.”<sup>96</sup> Member states are required to establish a verifiable approval process that allows for the establishment of regulated agents within the member states civil aviation security program as outlined in Article 10 EC 300/2008. Companies that forward and haul freight are required to meet and certify compliance with the strict training and documentation standards imposed by the EC 300/2008. These regulatory mandates require enhanced training standards, and as in the United States, background checks for employees are similar to TSA’s STA process. As a result, those companies that produce cargo and are capable of meeting these standards are then recognized as a known consigner, which exempts the company from additional security screening when providing air cargo to a regulated agent for transportation on air passenger and all air cargo aircraft.<sup>97</sup> This process is illustrated in the below figure which provide a visual depiction of the European Union 3<sup>rd</sup> country security processes.

---

<sup>96</sup> Official Journal of the European Union, *Commission Regulation (EU) N. 185/2010*, March 4, 2010.

<sup>97</sup> European Union, “European Commission-MEMO/10/545, Air Cargo Security.”

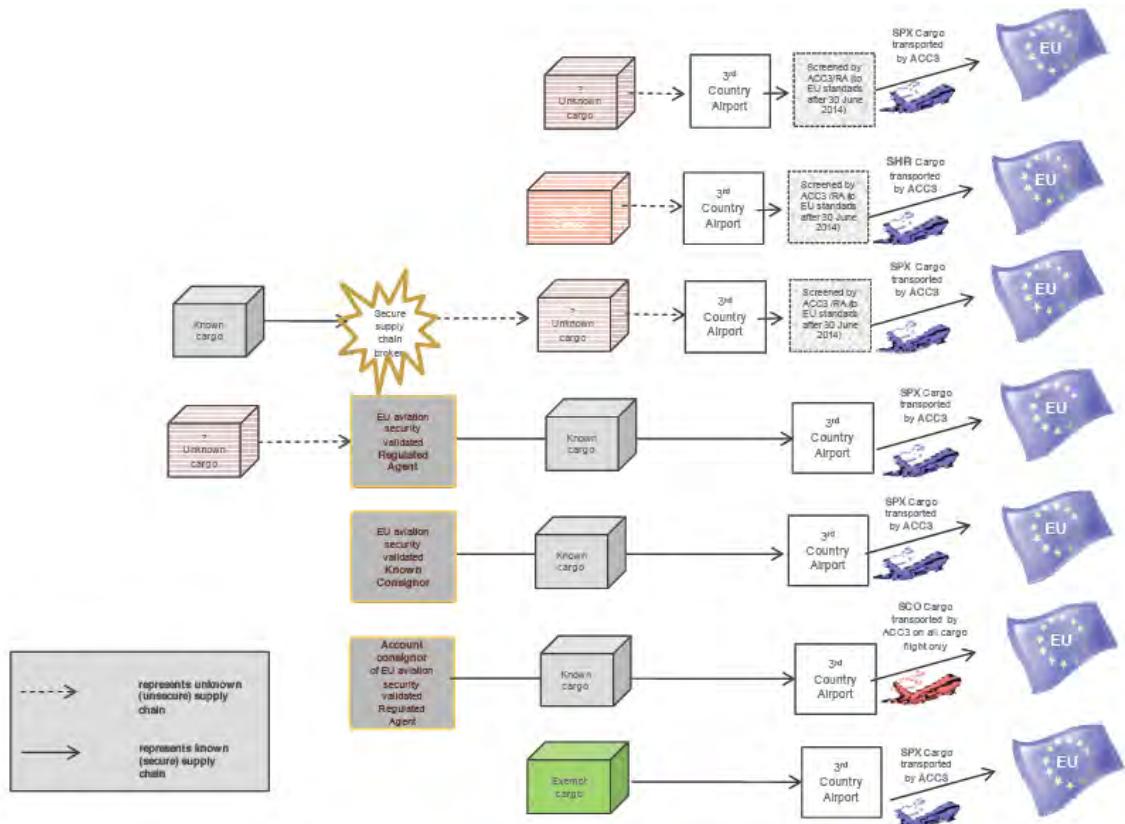


Figure 6. European Union 3rd Country Airport Process<sup>98</sup>

Unlike within the United States, the European Union does not have a singular police mechanism beyond the member states' borders, with the exception of International Criminal Police Organization (INTERPOL), whose mission is to provide help and guidance to law enforcement organizations by providing investigative training and guidance, as well as secure communication and communication channels.<sup>99</sup> All other intelligence and criminal investigative responsibilities fall to the member states' military, border police, or national police. Each member state is responsible for providing funding and operational guidance to these law enforcement organizations and often allocates

<sup>98</sup> Directorate General for Internal Policies, *The EU Regulatory Framework Applicable to Civil Aviation Security*, 2011.

<sup>99</sup> Interpol, "Organization Overview and Mission," n.d., <http://www.interpol.int/About-INTERPOL/Overview>.

operation resources based upon the threat guidance provided by the member state's intelligence organization.<sup>100</sup>

In much the same manner that the TSA is limited to regulating air cargo operations within the jurisdictional boundaries of the United States, the European Union is only capable of enforcing its jurisdictional authority on those countries members of the European Union, which is at an additional disadvantage when it comes to law enforcement and intelligence operations. Each EU member state is solely responsible for law enforcement and intelligence operations within those states borders. While the TSA as a federal organization within the United States has the authority to mandate the coordinated dissemination of threat information, member states within the European Union are only required to follow and implement EU regulations within their means and capabilities and may "derogate from the common standards to adopt alternative measures providing an 'adequate' level of aviation security."<sup>101</sup> The European Union has the right to conduct civil aviation inspections as a means of ensuring regulatory compliance by the member state. As highlighted in the U.S. system, compliance to the air cargo regulatory framework is limited to members of the European Union, which is incapable of enforcing these regulatory requirements on non-members that participate in the air cargo industry.

### C. THE PROPOSED AIR CARGO POLICY CHANGE

It is recommended that the TSA, in combination with CBP, use the Department of State's (DOS) Intelligence and Threat Analysis (ITA) sections protocols as the basis for a first level evaluation of risk for air passenger and all cargo aviation shipments. Since industry and employee data cannot be gathered as a means of conducting a STA, the DOS ITA can serve as a vital bridge between the DOS and the IC by producing real time country level threat and trend analysis. The ITA is able to produce this analysis through the creation and administration of the Security Environment Threat List (SETL), which

---

<sup>100</sup> U.S. General Accounting Office, *Report to Congressional Requesters, Combating Terrorism, How Five Foreign Countries Are Organized to Combat Terrorism*.

<sup>101</sup> Directorate General for Internal Policies, *The EU Regulatory Framework Applicable to Civil Aviation Security*.

provides an analytical view of four threat and security categories.<sup>102</sup> Two of the products provided to the public include DOS travel alerts designed to provide security guidance to travelers, and travel warnings designed to provide real time threat information to citizens about products that detail security threats and travel restrictions to the American public. A similar process should be developed in conjunction with the DOS that would allow for regional and country specific threat categorization that could be applied to air cargo departing identified threat countries. This initial evaluation would provide an opportunity to ensure high-risk cargo is prevented from transport on air passenger aircraft or all air cargo aircraft at the point of origin or that a verifiable enhanced screening technique is applied to authorize the transport of air cargo from the threat region is authorized on air passenger and air cargo aircraft.

---

<sup>102</sup> U.S. Department of State, Diplomacy in Action, “Intelligence and Threat Analysis,” 2013, <http://www.state.gov/m/ds/terrorism/c8584.htm>.

## VI. JURISDICTIONAL HURDLES

The difficulty with coordinating transnational terrorism investigations and operations has been well documented in the media, government reports, and academic publications. The Wall Street Journal focused on these difficulties in an 2010 article that detailed the security gaps and used the below illustration to highlight the international security failures. This chapter focuses on the implementation issues faced by the TSA as it pertains to verifying and enforcing the implementation of the 100 air cargo-screening requirement. The established processes of the United States and the European Union is discussed and each system's capabilities and limitations are explored. Additionally, a discussion of the possible difficulties and benefits of implementation of the proposed system are evaluated.

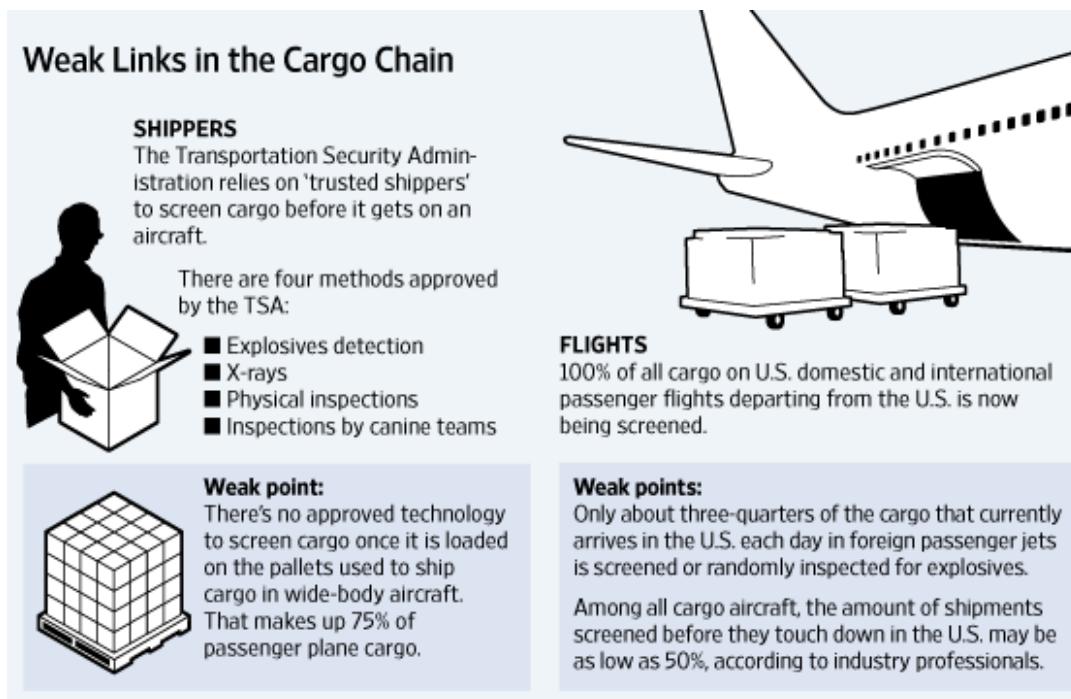


Figure 7. Weak Links in the Air Cargo Chain<sup>103</sup>

<sup>103</sup> Andy Pasztor, Keith Johnson, and Daniel Michaels, "Focus on Cargo Security Steps," *The Wall Street Journal*, November 1, 2010, <http://online.wsj.com/article/SB10001424052748703708404575586811087404960.html>.

## A. THE U.S. AIR CARGO SYSTEM

According to the *Implementing the 9/11 Commission Recommendations Act of 2007*, all air cargo transported on passenger aircraft is required to receive security screening at a level commensurate with the screening provided to passenger baggage. In accordance with the *Implementing Recommendations of the 9/11 Commission Act of 2007*, the 100 percent screening process for domestic cargo on passenger aircraft was to be completed by August 2010. The TSA, through ATSA, is tasked with regulating the screening of passengers and cargo.<sup>104</sup> This requirement is further codified in 49 CFR Part 1542—Airport Security, which outlines the regulatory relationship between the TSA and airport operators.<sup>105</sup> To meet this requirement, the TSA developed and implemented a layered security methodology for the vetting and screening of domestic and international cargo shipments in the air cargo supply chain. The goals of these programs are detailed in the TSA Air Cargo Strategic Plan, which states the priorities as: 1) enhancing supply chain and shipper security, 2) identifying elevated risk cargo through pre-screening, 3) identifying technology for performing targeted inspections, and 4) securing all-cargo aircraft through the appropriate application of security measures.<sup>106</sup> Cargo operations are regulated under 49 CFR Part 1544.205—Acceptance and Screening of Cargo, which states that aircraft operators are responsible for preventing the carriage of explosives in cargo onboard aircraft and how this should be accomplished.<sup>107</sup>

As for international air cargo security, since the TSA has no authority to place regulatory restrictions upon the foreign nation's shippers as a means of securing the air cargo supply chain, enforcement of the 100 percent air cargo screening requirement has been difficult. As a means of bridging this gap, the TSA has signed agreements with the European Commission, Canada, Australia, and the member states of the European Union. The goal of these agreements is to close the gap in international practices by harmonizing

---

<sup>104</sup> Govytrack.us., “S. 1447 (107th): Aviation and Transportation Security Act.”

<sup>105</sup> U.S. Government Printing Office, “49 CFR Part 1542—Airport Security.”

<sup>106</sup> Transportation Security Administration, *Cargo Security Sensitive Security Identification Guide*, SSIIDG 0050 Version 1.0, May 2007.

<sup>107</sup> U.S. Government Printing Office, “49 CFR Part 1544.205—Aircraft Operator Security: Air Carriers and Commercial Operators.”

the air cargo security practices beyond U.S. borders. The TSA states on its air cargo frequently asked questions website, “this harmonization will greatly contribute to achieving the 100 percent screening requirement of the 9/11 Act.”<sup>108</sup> These agreements were necessary because, as stated by the Honorable Charles W. Dent from Pennsylvania during his June 30, 2010 Congressional testimony, “International enforcement is, very frankly, impossible.” and despite this proclamation went on to say, “as the Ranking Member of the subcommittee that oversees TSA, I am going to ensure compliance with the law.”<sup>109</sup> Despite the industries’, governments’ and congressional acknowledgment of the improbability of a successful execution of the 100 percent air cargo screening protocol, the requirement continues to exist.

The TSA’s alternative plan for resolving the jurisdictional conflicts associated with international compliance is dependent on raising the airlines screening requirements while continuing to work with foreign governments to create and certify compliant air cargo screening capabilities and inspection processes.<sup>110</sup> While within the United States the TSA is able to enforce air cargo screening requirements through the employment of TSI-C, enforcement operations and inspections outside of the TSA’s jurisdiction, is dependent on the responsible governments and associated agencies.<sup>111</sup> As a result of these jurisdiction difficulties, John Meenan, the Chief Operating Officer of the Air Transport Association, stated in his congressional testimony that “the most practical approach internationally rests with the approval of government-to-government compatible security programs.”<sup>112</sup> Multinational collaboration and cooperation is always difficult to accomplish in an open trade environment. This issue additionally includes the necessity to gain and verify regulatory compliance from domestic and foreign air carriers, as well as the governments of foreign countries. The review and acceptance of air carrier security programs dates as early as 1990 when the Presidential Commission on Aviation

---

<sup>108</sup> Transportation Security Administration, “Frequently Asked Questions.”

<sup>109</sup> Dent, “100 Percent Air Cargo Screening: Remaining Steps to Secure Passenger Aircraft, Hearing before the Subcommittee on Transportation Security and Infrastructure Protection.”

<sup>110</sup> Ibid.

<sup>111</sup> Ibid.

<sup>112</sup> Ibid.

Security and Terrorism first explored and addressed the issue in the wake of the attack on Pan Am flight 103.<sup>113</sup> Despite the continued effort to harmonize security processes and procedures internationally, enforcement and regulation continue to prevent an administratively acceptable solution.

## B. THE EU AIR CARGO SYSTEM

The EU regulatory framework applies to all its member states and is updated regularly to ensure the member states' ability to address evolving risks and threats.<sup>114</sup> As such, these member states are required to ensure the security of flights departing their territories. In response to the attacks on 9/11, the European Union passed regulation 2320/2002 that established the EU's aviation security goals. As stated in 2320/2002, "The main objective of this Regulation is to establish and implement appropriate Community measures, in order to prevent acts of unlawful interference against civil aviation."<sup>115</sup> Furthermore, the European Union established Commission Regulation (EC) No 622/2003 on 4 April 2003, which establishes measures for the implementation of the common basic standards on aviation security, the majority of which are appropriately classified at the secret level.<sup>116</sup> Just as 49 CFR 1550 established the authority of the TSA to regulate aviation within the United States, EC 622/2003 was designed to "lay down the necessary measures for the implementation and technical adaptation of common basic standards regarding aviation security to be incorporated into national civil aviation security programs."<sup>117</sup> As the aviation industry and associated regulatory organization began to focus on preventing dangerous and hazardous cargo from being transported on air passenger aircraft, the EU Council published EC 831/2006 that states:

---

<sup>113</sup> PolicyFutures, "Report of the Presidents Commissions on Aviation Security and Terrorism," 34.

<sup>114</sup> Directorate General for Internal Policies, *The EU Regulatory Framework Applicable to Civil Aviation Security*.

<sup>115</sup> Official Journal of the European Union, "Commission Regulation (EC) No 2320/2002 of 16 December 2002," 2002, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:355:0001:0021:EN:PDF>.

<sup>116</sup> Official Journal of the European Union, "Commission Regulation (EC) No 622/2003 of 4 April 2003."

<sup>117</sup> Ibid.

(3) As regards the measures for the implementation of the standards on airline materials and on cargo, courier and express parcels, the content of Regulation (EC) No 622/2003 should be revised in the light of experience gained.<sup>118</sup>

Similar to the process employed in the United States by the TSA, the European Commission is responsible for the monitoring of the member states to ensure compliance with the regulation.<sup>119</sup> This monitoring is accomplished with unannounced regulatory inspections and enforcement operations. Member states are required to comply with the inspections and to make auditors available for participation in the inspection. As with the TSA, when it comes to third-country shippers, the European Union also does not have the necessary regulatory authority to require compliance with the EU regulations. As a result, the European Union seeks cooperation from third countries through the acceptance of security practices and standards as way to “facilitate air transport and contribute to the objective of ‘on-stop-security’” by recognizing “the equivalence of aviation security standards of third countries.”<sup>120</sup> Similar to the concerns faced by the United States, when it comes to accepting the process and procedures of a foreign nation, the European Union does not have the capability to regulate or enforce security protocols outside its jurisdictional boundaries, which hinders the ability to verify the acceptability of the third-countries protocols.

## C. THE PROPOSED AIR CARGO POLICY

Unfortunately, no good solutions are available to the jurisdictional gaps that exist at the point in which international trade and government regulation intersect. The proposed system of evaluating international air cargo is no different from the EU or the U.S. system in this shortcoming. The ability of a foreign country to attempt to enforce its regulatory authority upon a secondary country is simply implausible. Without the ability

---

<sup>118</sup> Official Journal of the European Union, “Commission Regulation (EC) No 831/2006 of 2 June 2006,” 2006, <http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:150:0004:0005:EN:PDF>.

<sup>119</sup> European Parliament, “The EU Regulatory Framework Applicable to Aviation Security,” 2011, <http://www.europarl.europa.eu/studies>.

<sup>120</sup> Ibid.

to impose fiscal or operational penalties on the regulated industry or country, the authority of the regulating agency is significantly diminished.

The one possible solution to a failure of a foreign country to comply with the screening requirements that could be imposed is that used by CBP when passengers are brought into the United States without the appropriate visas or authorizations. CBP regularly requires international air carriers to pay for the cost of returning foreign nationals to their point of departure if they arrive in the United States without the proper documentation, visas, or authorizations. Applying this process to air cargo that arrives in the United States without having been appropriately screened prior to departure from the point of origin would provide a fiscal incentive for the air carrier to ensure the appropriate processes and procedures were followed prior to transport. While not an effective prevention or detection solution, it does provide a fiscal motivation for the airline to comply with the screening protocols.

## VII. AIR CARGO SECURITY SYSTEM COSTS

Many hurdles to the implementation of a 100 percent air cargo screening protocol exist. One of the most often cited and documented hurdles noted in government and industry reports are the costs associated with this requirements implementation. The application of this process in an international environment further exacerbates the costs associated with its implementation because of the varied protocols, technologies, and capabilities in the affected countries. The journal of the European Union used the below scales of justice as a means of providing a visual depiction of the trade offs associated with increased security and the effects these increases have on trade. This chapter explores the projected costs associated with the implementation of the 100 percent air cargo screening protocol for the United States and the European Union, and the projected savings of implementing a risk-based intelligence driven system.



Figure 8. Security Costs and Economic Impact<sup>121</sup>

### A. THE AIR CARGO SYSTEM

The air cargo industry is designed to provide fast and efficient transportation of consumer products across the global supply chain. Since the air cargo industry is such a

<sup>121</sup> Official Journal of the European Union, “Commission Regulation (EC) No 1802/2012 of 9 November 2012,” 2012, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:324:0025:0049:EN:PDF>.

diverse organization that regularly crosses international boundaries, it is difficult to accurately assess the economic impact the 100 percent air cargo screening requirement will have on the affected economies and the industry. It is further more difficult to separate the economic impact the mandate will have on both the U.S. and EU economies without discussing them simultaneously. Instead of attempting to accomplish this task, this chapter examines the cumulative impact the regulatory change will have on the economies and industry concurrently.

In 2011, air cargo merchandise transportation accounted for an estimated \$424,265 million in U.S. exports and \$493,038 million in U.S. imports.<sup>122</sup> Comparatively, the European Union had air trade imports valued at 292.1 billion euros and exports valued at 362 billion euros during 2010.<sup>123</sup> In 2010, air passenger aircraft operators alone transported an estimated 3.6 billion pounds of air cargo to the United States from foreign points of origin.<sup>124</sup> In testimony before Congress in 2010, John Sammon, Assistant Administrator of TSA, stated that an estimated “2.8 billion pounds of air cargo arrives on passenger aircraft from 94 different sovereign nations annually via a global air cargo supply chain with a vast number of participants.”<sup>125</sup> Anytime a universal requirement is placed on such a vast and complex industry that contains such a widespread group of stakeholders, it is difficult to predict the unintended costs and consequences.

The implementation of the 100 percent air cargo security screening mandate cost was estimated by the Center for American Progress in a 2007 study to be at least \$600 million annually for the air cargo shipping industry. According to the International

---

<sup>122</sup> Vivian C. Jones and Marc R. Rosenblum, *U.S. Customs and Border Protection: Trade Facilitation, Enforcement and Security*, CRS Report R43014 (Washington, DC: Library of Congress, Congressional Research Service, March 22, 2013), 39.

<sup>123</sup> Official Journal of the European Union, “Commission Regulation (EC) No 1802/2012 of 9 November 2012,” 9.

<sup>124</sup> U.S. Government Accountability Office, *Report to Congressional Requesters, Aviation Security, Actions Needed to Address Challenges and Potential Vulnerabilities Related to Securing Inbound Air Cargo* (GAO-12-632), Washington, DC: GPO, 2012, <http://www.gao.gov/products/GAO-12-632>.

<sup>125</sup> John Sammon, “100 Percent Air Cargo Screening: Remaining Steps to Secure Passenger Aircraft. Hearing before the Subcommittee on Transportation Security and Infrastructure Protection,” 2010, <http://www.gpo.gov/fdsys/pkg/CHRG-111hhrg64699/html/CHRG-111hhrg64699.htm>.

Air Cargo Council, imposing the 100 percent air cargo screening mandate creates “additional cost burdens on the U.S. economy, negatively impacting businesses—both small and large—with the establishment of cargo security and inspection protocols that rely on unproven technologies and that do not insure security improvements that are commensurate with the expenses incurred.”<sup>126</sup> In 2007, TSA spokeswoman Andrea McCauley estimated that the 10-year cost of implementing the 100 percent air cargo-screening mandate would be approximately \$3.6 billion while a CRS analysis similarly placed the implementation costs at approximately \$3.7 billion over the same 10-year period.<sup>127</sup> In his 2007 testimony before the subcommittee on transportation, Pennsylvania Congressman Charles Dent discussed the cost of the 100 percent air cargo-screening mandate when he said the measure “placed an expensive and burdensome mandate without adding any tangible security benefit.”<sup>128</sup>

The application of the 100 percent air cargo screening protocol also creates government costs. As early as 2001, the FAA conducted an analysis to determine the feasibility and cost of screening all passenger air cargo. The FAA analysis determined that to accomplish the 100 percent passenger air cargo screening goal, 8000 federal air cargo screeners would be required, and a budget of \$500 million would be necessary to create the cargo inspection program. Today, the TSA’s Transportation Sector Network Management Air Cargo Divisions 2011 budget was \$115 million. These funds were used to support air cargo inspections, explosive canine operations and the National Explosives Detection Canine Program.<sup>129</sup> In Senate Report 112-074, which details the appropriations for TSA’s security programs, the 112th Congress allocated \$120,654,000 for air cargo

---

<sup>126</sup> Perry Trunick, “Opposition Gathers to H.R. 1 Security Regulations,” *Material Handling & Logistics*, 2007, <http://mhlnews.com/transportation-and-distribution/opposition-gathers-hr-1-security-regulations>.

<sup>127</sup> Bart. *Air Cargo Security*.

<sup>128</sup> Dent, “100 Percent Air Cargo Screening: Remaining Steps to Secure Passenger Aircraft. Hearing before the Subcommittee on Transportation Security and Infrastructure Protection.”

<sup>129</sup> U.S. Government Accountability Office, *Report to Congressional Requesters, Aviation Security, Actions Needed to Address Challenges and Potential Vulnerabilities Related to Securing Inbound Air Cargo*, 11.

security activities.<sup>130</sup> This number represented a 6,000,000 dollar increase beyond the funds requested which represented targeted funding designed to secure all air cargo aircraft and facilities, as well as international air cargo being transported on inbound air passenger aircraft. Similar to the government and industry analysis and projected costs that have been broadly discussed and cited regarding the U.S. implementation of the 100 percent air cargo security requirement, the EU's implementation process faces comparable costs and challenges. In an EU Commission sanctioned report on the implementation of the new screening requirements, an analysis of the incurred costs based upon the percentage of cargo screened determined that at a 45 percent screening level assuming a .025 Euros surcharge per kilo, the accumulated screening cost would be 38.3 million Euros.<sup>131</sup> A surcharge of .05 would raise the estimate to 85.3 million Euros. Additionally, the initial cost for the training and certification of 166 EU aviation security validators would be approximately 1.5 million Euros.<sup>132</sup> The report continued to note that if the number were raised to 401 EU aviation security validators, the cost would jump to 2.8 million Euros.<sup>133</sup>

The balance between security and an unencumbered industry is a difficult pathway to navigate. Determining at what point the cost of a process exceeds the benefit the added security provides has been a source of debate and analysis within the government and media since the attacks on 9/11. In the final analysis, the critical question that needs to be answered is whether the use of 100 percent air cargo security screening, which carries a significant number of negative cost implications, is justified by the greater impregnability of the international air cargo supply chain.<sup>134</sup> While the tremendous volume of air cargo combined with the significant negative economic impact

---

<sup>130</sup> The Library of Congress Thomas, “Committee Reports, 112th Congress (2011–2012) Senate Report 112–074,” [http://thomas.loc.gov/cgi-bin/cpquery/?&sid=cp1125c4Ad&r\\_n=sr074.112&db=name=cp112&&sel=TOC\\_236142&](http://thomas.loc.gov/cgi-bin/cpquery/?&sid=cp1125c4Ad&r_n=sr074.112&db=name=cp112&&sel=TOC_236142&).

<sup>131</sup> Official Journal of the European Union, “Commission Regulation (EC) No 1802/2012 of 9 November 2012,” 7.

<sup>132</sup> Ibid.

<sup>133</sup> Ibid.

<sup>134</sup> Policy Research Corporation, *The Impact of 100 percent Scanning of U.S. Bound Container on Maritime Transport, Final Report*, 2009.

an attack on the global air cargo supply chain would have on the U.S. and European economies requires the pursuit of an improved air cargo security solution, the greater question is if the cost of implementing a 100 percent air cargo screening requirement is a fiscally responsible solution.

## B. THE PROPOSED AIR CARGO POLICY

The proposed system seeks to apply known and readily available programs, systems, and data streams to what are today a splintered international air cargo security process with separate requirements within multiple agencies. While costs will certainly be associated with the implementation and integration of these systems, the burden of the costs will not be associated with instituting new and untested systems, technologies, and regulatory requirements. The current 100 percent air cargo security screening protocol process places the cost on the shoulders of the aviation and shipping industries. Assuming a risk-based intelligence driven system has the ability to reduce the required 100 percent air cargo screening by 50 percent, and using the Center for American Progress 2007 study of the air cargo shipping industry costs for implementing a 100 percent air cargo screening requirement, the proposed system has the capability to save the air cargo industry approximately \$300 million annually.<sup>135</sup> Over a decade, the possible reduction in screening of low risk cargo has the ability to translate into a 1.5 billion dollar savings using the TSA's and CRS's 10-year cost estimates for the current system.<sup>136</sup> The greater benefit will be the cost savings realized by the efficient use of enforcement and regulatory assets. While the current system will require that all air cargo be treated equally, the proposed system looks to target those air cargo shipments that pose the greatest threat to the aviation industry by assessing the risk of the shipment, shipper, region, and the aircraft type, and then applying the appropriate threat and security level to the item that then allows security and law enforcement specialists to require or reduce the screening requirement to ensure the appropriate use of the limited security assets.

---

<sup>135</sup> P. J. Crowley and Bruce R. Butterworth, "Keeping Bombs off Planes, Securing Air Cargo, Aviation's Soft Underbelly," *Center for American Progress*, May 2007, [http://www.americanprogress.org/issues/2007/05/pdf/air\\_cargo.pdf](http://www.americanprogress.org/issues/2007/05/pdf/air_cargo.pdf).

<sup>136</sup> Bart. *Air Cargo Security*.

THIS PAGE INTENTIONALLY LEFT BLANK

## **VIII. RECOMMENDATIONS AND CONCLUSIONS**

### **A. ADOPTION OF A RISK BASED INTELLIGENCE DRIVEN AIR CARGO SCREENING PROTOCOL**

For the TSA to move towards a risk-based intelligence driven air cargo screening operation, a shift from the 100 percent screening model and mandates must be made. CBP has historically conducted risk-based and intelligence driven passenger and cargo operations out of the National Targeting Center (NTC). Additionally, the TSA regularly applies risk-based strategies to domestic and international passenger air travel through the use of interagency operations at the NTC and risked-based security initiatives, such as TSA Pre✓, the under 12 and over 75 modified screening procedures, and the Know Crew Member Database, while maintaining a security randomization process that ensures no passenger is exempt from the possibility of the full security protocols as outlined in the ATSA. TSA's Kenneth Fletcher provided the below depiction of a risk based passenger screening process in his thesis which argued for the implementation of such a protocol as a means of more efficiently and effectively screening passengers in the aviation domain.

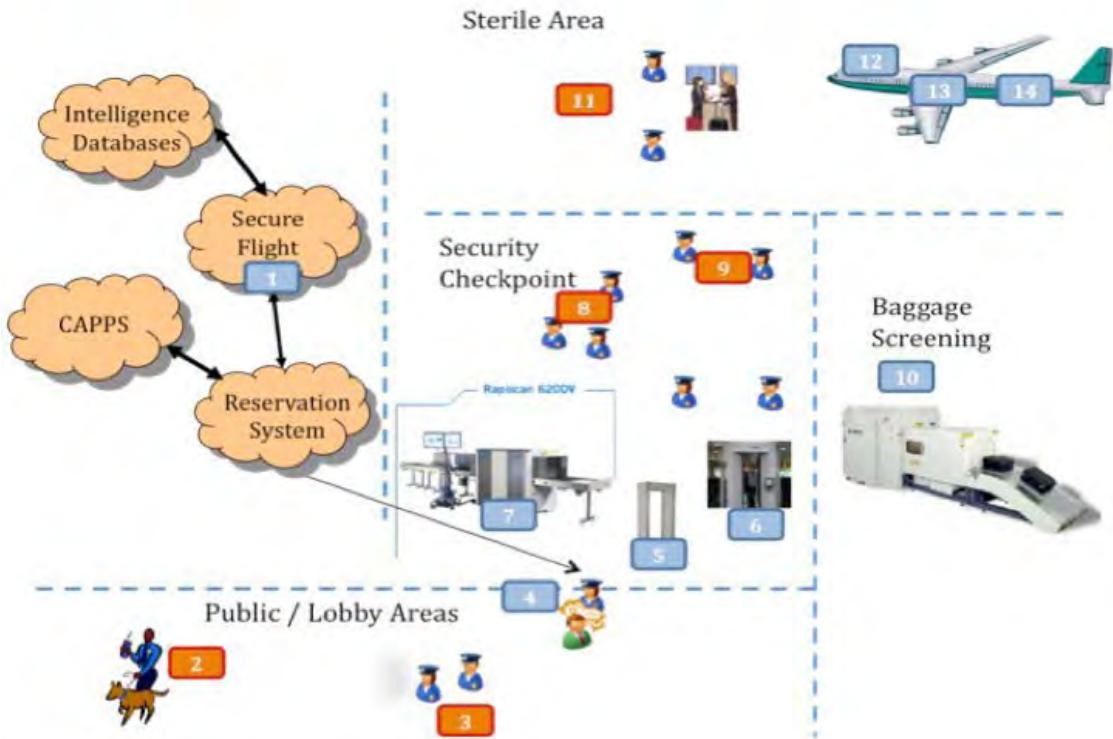


Figure 9. Risk-Based Screening<sup>137</sup>

The proposed policy change is designed to create a base line from which the program can be established and then expanded. Each tier in the process is used as a threat screening method with the goal of separating the cargo that poses the greatest real or perceived threat from the cargo that poses a lower threat to aviation. This process does not require the physical screening of the cargo but rather is a data driven procedure that allows for the rapid separation of cargo into distinct threat levels. Each threat grouping is then subject to the necessary level of physical or administrative screening as opposed to the now required 100 percent screening mandate.

The tiers are not meant to remain as a static screening mechanism. The intent of the tiered system is to allow each grouping to be adjusted based on a risk- and threat-based intelligence system. Each tier can be rapidly adjusted and adapted to the threat and risk associated with regions, periods of heightened awareness, or parcel types. While the

---

<sup>137</sup> Kenneth Fletcher, "Aviation Security: A Case for Risk-Based Passenger Screening" (master's thesis, Naval Postgraduate School, 2011), <http://www.hndl.org/?view&did=699603>.

initial policy includes a three-tiered system, it should be seen as a static part of the policy. The process was developed with the intention of creating a flexible, adaptable, and sustainable screening system. If more tiers are required to ensure the proper screening of air cargo, they should be added. Additionally, once a tier is added, it is not necessary to keep that tier indefinitely. If the tier has served its purpose, and is no longer needed because a threat period has passed, then when appropriate, it should be removed.

## **1. Tier One**

It is recommended that the TSA and CBP use the DOS's ITA sections protocols as the basis for a first level evaluation of risk for air passenger and all cargo aviation shipments. The DOS ITA serves as a vital bridge between the DOS and the IC, which produces real time threat and trend analysis. The ITA creates and administers the SETL, which provides an analytical view of four threat and security categories.<sup>138</sup> Two products provided to the public include DOS travel alerts designed to provide security guidance to travelers, and travel warnings designed to provide real time threat information to citizens in products that detail security dangers and travel restrictions to the American public. A similar process should be developed in conjunction with the DOS that would allow for regional and country specific threat categorization that could be applied to air cargo departing threat countries. This initial evaluation would provide an opportunity to ensure high-risk cargo is prevented from transport on air passenger aircraft, or all air cargo aircraft or that verifiable enhanced screening techniques are applied to authorize the transport of air cargo from the threat region on air passenger and air cargo aircraft.

## **2. Tier Two**

The TSA and CBP would continue to conduct assessments of domestic and international cargo facilities for regulatory compliance and would retain administrative oversight of these public entities. The TSA would ensure domestic compliance of shippers with 49 CFR 1542 (Airport Security Regulation), 1544 (Domestic Aircraft Operator Regulation), and 1546 (Foreign Air Carrier Security), which detail the process

---

<sup>138</sup> U.S. Department of State, Diplomacy in Action, "Intelligence and Threat Analysis."

for compliance with the aircraft operator standard security program, the model security program, and airport security programs that detail the processes necessary to comply with the federal regulations pertaining to aviation operations. The TSA and CBP would continue to evaluate the value of the air cargo strategic plan and ACAS pilot program that applies established threat-based risk management protocols to aviation cargo security operations. Additionally, the TSA should expand the known shipper program beyond the 400,000+ voluntary participants creating a mandatory participation protocol, which would allow for an increased visualization of air cargo security operations and data collection. The larger the data available for analysis, the stronger the program will become. Effective data collection and analysis can be best accomplished by making a concerted effort to increase the population base available. Efforts should be increased to improve industry participation in this portion of the process.

### **3. Tier Three**

Two classes of air cargo should be created. The TSA and CBP should differentiate the threat posed by a screening failure in air cargo on passenger aircraft and air cargo on all air cargo or all airmail aircraft, as is done in by EU Commission Regulation No 185.2010. The implementation of a risk- and consequence-based security protocol is consistent with the pending Quadrennial Homeland Security Review. A risk and consequence application, which is based on the impact of an attack on each mode of transportation, would provide the balance desired by industry leaders and the flexibility sought by the governing officials. Of particular note in EU Regulation No 185/2010 is the designation of cargo secure for passenger, all-cargo, and all-mail aircraft, and the distinction of cargo secure for all-cargo and all-mail aircraft only, based on a known consignor and the means or method of screening, which allows shippers the ability to adjust screening process dependent on the method of transport required. This differentiating methodology is absent in the TSA and CBP processes. The ability to distinguish the consequence level based on passenger aircraft versus the all air cargo and mail aircraft is a significant advantage for the European Union as opposed to the all threats all consequence inclusive system the United States uses under the current 100 percent air cargo security screening congressional mandates.

A group within the NTC should be created with the goal of developing a risk-based screening protocol that would combine the numerous and overlapping programs that currently exist separately within the TSA and CBP while continuing to meet the goals and mandates of each agency. This group would additionally be tasked with creating a unified air cargo security plan and protocols. The application of joint operations and analysis, a risk- and consequence-based targeting system will allow for an extensive and multi-dimensional assessment of air passenger cargo and all air cargo aircraft in the global supply chain to limit terrorist and criminal organizations from capitalizing on the identified weaknesses in these systems.

The TSA and CBP should formally combine cargo security targeting and screening operations while seeking to have Congress shift the mandated operational emphasis away from the 100 percent screening mandate and move towards a risk- and consequence-based screening protocol that would provide a flexible, adaptable, resilient, sustainable, and balanced process that protects industry and customer interests while ensuring a secure domestic and international air cargo supply chain.

## **B. CHALLENGES TO IMPLEMENTATION**

The global supply chain is a complex and continuously evolving entity that makes it difficult for a single agency with limited resources to ensure its security. A combined effort to secure air cargo by the TSA and CBP could provide the depth of experience and breadth of resources necessary to improve the current system, which is both cumbersome and duplicative. A combined risk-based intelligence driven air cargo security effort would best accomplish the goals and mandates of the *Aviation Transportation Security Act of 2001* and the *Implementing Recommendations of the 9/11 Commission Act of 2007*. The problem has been recognized and well documented in government reports and testimony, as well as in industry trade journals.

Prior to and after 9/11, the GAO and CRS conducted numerous inquiries into the air cargo supply chain and have generated voluminous reports that have identified the scope of the issue, the failures, and the successes of both the TSA's and CBP's air cargo screening. As a result of this failure, several process groups have been created within the

TSA and CBP that include foreign counterparts and industry leaders in the global supply chain. In each instance, the focus has been on the need for collaboration and industry participation to meet the 100 percent air cargo screening congressional mandates despite the universal agreement that such a process is cumbersome and inefficient.

In 2009, CBP and the TSA created a working group with the intent of determining the feasibility of using CBPs ATS to support the cargo-screening mission of the TSA. Following the 2010 air cargo attack, the working group's activities were accelerated and a voluntary pilot program was established to determine the feasibility of a combined cargo security effort between CBP and the TSA.<sup>139</sup> To date, the ACAS pilot, which was extended this past April, has been used to evaluate 14 million shipments in the express segment of the air cargo system by using available data and shipper information.<sup>140</sup> Although progress has been made, the system remains voluntary and still does not cover all segments of the air cargo supply chain, and as a result, both agencies failed to detect the 2010 Yemen air cargo attack.

For the TSA to move towards a risk-based intelligence driven air cargo screening operation, a shift from the congressionally mandated 100 percent screening model would be necessary. This hurdle will require a repeal or modification of the legislation that mandates this requirement, which will be difficult but not impossible. As previously noted, the TSA is implementing robust risk-based passenger screening protocols. The move from the 100 percent all threat passenger-screening protocols provides an opportunity for the evaluation of the necessity and feasibility of the 100 percent air cargo screening processes. The 100 percent air cargo security screening protocols continue to be developed despite the compelling industry and governmental testimony citing the fiscal and jurisdictional obstacles and infeasibility of applying such a regimented system of security. An alternative solution to this problem is to both redefine the screening process and to combine the resources of CBP and the TSA in the ACAS system. This

---

<sup>139</sup> Department of Homeland Security, “Air Cargo Advance Screening (ACAS) Pilot,” *CBP.gov*, August 2011, [http://www.cbp.gov/xp/cgov/trade/cargo\\_security/cargo\\_control/acasp\\_faq.xml](http://www.cbp.gov/xp/cgov/trade/cargo_security/cargo_control/acasp_faq.xml).

<sup>140</sup> Transportation Security Administration, “Air Cargo 2012 Spring Conference, TSA Administrator John S. Pistole, Remarks As Prepared for Delivery, Air Cargo 2012 Spring Conference, Miami, Florida, March 20, 2012,” March 20, 2012, <http://www.tsa.gov/press/speeches/air-cargo-2012-spring-conference>.

process, in addition to the three-tiered system previously described, can be used to meet the requirements imposed by the congressionally mandated 100 percent screening protocol while eliminating the need to physically inspect all air cargo.

CBP has historically applied risk-based strategies to international passenger air travel through joint operations at the NTC, and the TSA has moved towards a more efficient risk-based screening process, which allows each agency to allocate the defined and limited resources properly that have become the reality of the currently restricted government operations cycle.

### **C. LIMITATIONS OF THE RESEARCH**

This project was begun as a means of determining the possibility of applying a risk-based intelligence driven international air cargo screening protocol to the transport of international air cargo to help secure the aviation industry and passengers in light of the successful attack on air cargo aircraft by AQAP in November 2010. As a means of accomplishing this task, an analysis of the polices of the United States and the European Union was conducted to determine the best policy and process for securing this specific section of the aviation environment. Numerous program and polices were reviewed to include the TSA's risk based screening, the TSA and CBP ACAS pilot program, and the European Union's regulatory approach to aviation security.

As a means of ensuring the widest dissemination possible, this research project did not include the review of classified or sensitive security information, as this inclusion would have significantly limited the ability of the information to be viewed and analyzed by a wider audience. The intention of this project was to advance the understanding of the challenges faced by the aviation industry and the regulating agencies required to provide a secure travel and transportation environment, as well as a base line for further research to be conducted.

THIS PAGE INTENTIONALLY LEFT BLANK

## LIST OF REFERENCES

- ALJAZEERA. “Al-Qaeda Wing to Target US Economy.” November 21, 2010.  
<http://www.aljazeera.com/news/middleeast/2010/11/2010112110484673847.html>.
- Al-Malaham Media. “Special Issue.” *Inspire Magazine* no. 3 (November 2010).  
[http://ia600304.us.archive.org/28/items/INSPIRE\\_ISSUE\\_3/special.pdf](http://ia600304.us.archive.org/28/items/INSPIRE_ISSUE_3/special.pdf).
- Ariosto, David, and Deborah Feyerick. “Christmas Day Bomber Sentenced to Life in Prison.” *CNN*, February 17, 2012. <http://www.cnn.com/2012/02/16/justice/michigan-underwear-bomber-sentencing>.
- Associated Press. “Russia Plane Crashes Caused by Explosives.” August 30, 2004.  
[http://www.nbcnews.com/id/5810127/ns/world\\_news/t/russia-plane-crashes-caused-explosives/#.UlBkZRaPCZY](http://www.nbcnews.com/id/5810127/ns/world_news/t/russia-plane-crashes-caused-explosives/#.UlBkZRaPCZY).
- Bardach, Eugene. *A Practical Guide for Policy Analysis*. Washington, DC: CQ Press College, 2011.
- CNN. “Exchange Between Reid Judge, Follows Life Sentence.” December 6, 2003.  
<http://www.cnn.com/2003/LAW/01/30/shoebomber.sentencing/>.
- . “Plane Terror Suspects Convicted on All Counts.” September 5, 1996.  
<http://www.cnn.com/US/9609/05/terror.plot/>.
- Crowley, P. J., and Bruce R. Butterworth. “Keeping Bombs off Planes, Securing Air Cargo, Aviation’s Soft Underbelly.” *Center for American Progress*, May 2007.  
[http://www.americanprogress.org/issues//2007/05/pdf/air\\_cargo.pdf](http://www.americanprogress.org/issues//2007/05/pdf/air_cargo.pdf).
- de Rugy, Veronique. “The Economics of Homeland Security.” In *Terrorizing Ourselves: Why U.S. Counterterrorism Policy Is Failing and How to Fix It*, edited by Benjamin H. Friedman, Jim Harper, and Christopher A. Preble. Washington, DC: Cato Institute, 2010.
- Dent, Charles. “100 Percent Air Cargo Screening: Remaining Steps to Secure Passenger Aircraft, Hearing before the Subcommittee on Transportation Security and Infrastructure Protection.” 2010. <http://www.gpo.gov/fdsys/pkg/CHRG-111hhrg64699/html/CHRG-111hhrg64699.htm>.
- Department of Homeland Security. “Air Cargo Advance Screening (ACAS) Pilot.” *CBP.gov*, August 2011. [http://www.cbp.gov/xp/cgov/trade/cargo\\_security/cargo\\_control/acasp\\_faq.xml](http://www.cbp.gov/xp/cgov/trade/cargo_security/cargo_control/acasp_faq.xml).

- . Office of Inspector General. *Evaluation of Screening of Air Cargo Transported on Passenger Aircraft*. (DHS/OIG10-119). Washington, DC: U.S. Department of Homeland Security, September 2010. [http://www.oig.dhs.gov/assets/Mgmt/OIG\\_10-119\\_Sep10.pdf](http://www.oig.dhs.gov/assets/Mgmt/OIG_10-119_Sep10.pdf).
- . *Transportation Security Administration's Known Shipper Program*. (DHS/OIG-09-35). Washington, DC: U.S. Department of Homeland Security, March 2009. [http://www.oig.dhs.gov/assets/Mgmt/OIGr\\_09-35\\_Mar09.pdf](http://www.oig.dhs.gov/assets/Mgmt/OIGr_09-35_Mar09.pdf).
- Directorate General for Internal Policies. *The EU Regulatory Framework Applicable to Civil Aviation Security*, 2011.
- Edaptive Computing Inc. “Risk Analysis and Mitigation. (n.d.). <http://www.edaptive.com/solutions/capabilities/riskmanagement.aspx>.
- Elias, Bart. *Air Cargo Security*. CRS Report RL32022. Washington, DC: Library of Congress, Congressional Research Service, July 30, 2007. <http://www.fas.org/sgp/crs/homesec/RL32022.pdf>.
- . *Screening and Securing Air Cargo: Background and Issues for Congress*. CRS R41515. Washington, DC: Library of Congress, Congressional Research Service. December 2, 2010. [http://assets.opencrs.com/rpts/R41515\\_20101202.pdf](http://assets.opencrs.com/rpts/R41515_20101202.pdf).
- European Parliament. “The EU Regulatory Framework Applicable to Aviation Security.” 2011. <http://www.europarl.europa.eu/studies>.
- European Union. “European Commission-MEMO/10/545, Air Cargo Security.” May 11, 2010. [http://europa.eu/rapid/press-release\\_MEMO-10-545\\_en.htm](http://europa.eu/rapid/press-release_MEMO-10-545_en.htm).
- Fletcher, Kenneth. “Aviation Security: A Case for Risk-Based Passenger Screening.” Master’s thesis, Naval Postgraduate School, 2011. <http://www.hndl.org/?view&did=699603>.
- Gordon, Peter. “The Economic Impacts of a Terrorist Attack on the U.S. Commercial Aviation System.” *Create Homeland Security Center at the University of Southern California*, October 1, 2005. <http://create.usc.edu/research/50796.pdf>.
- Govtrack.us. “S. 1447 (107th): Aviation and Transportation Security Act.” 2001. <http://www.govtrack.us/congress/bills/107/s1447>.
- Homeland Security News Wire. “IEDs Growing Threat in U.S., Security Experts.” April 17, 2013. <http://www.homelandsecuritynewswire.com/dr20130417-ieds-a-growing-threat-in-u-s-security-experts>.
- Interpol. “Organization Overview and Mission.” (n.d.). <http://www.interpol.int/About-INTERPOL/Overview>.

- Jackson, B., and D. Frelinger. *Emerging Threats and Security Planning, How Should We Decide What Hypothetical Threats to Worry About?* RAND Corporation, 2009.
- Jones, Vivian C., and Marc R. Rosenblum. *U.S. Customs and Border Protection: Trade Facilitation, Enforcement and Security*. CRS Report R43014. Washington, DC: Library of Congress, Congressional Research Service, March 22, 2013.
- Library of Congress Thomas, The. “Committee Reports, 112th Congress (2011–2012) Senate Report 112-074.” 2012. [http://thomas.loc.gov/cgi-bin/cpquery/?&sid=cp1125c4Ad&r\\_n=sr074.112&dbname=cp112&&sel=TOC\\_236142&](http://thomas.loc.gov/cgi-bin/cpquery/?&sid=cp1125c4Ad&r_n=sr074.112&dbname=cp112&&sel=TOC_236142&).
- Masse, Todd, Siobhan O’Neil, and John Rollins. *The Department of Homeland Security’s Risk Assessment Methodology: Evolution, Issues, and Options for Congress*. CRS RL33858. Washington, DC: Library of Congress, Congressional Research Service February 2, 2007.
- McMaster, Nick. “Cargo Bomb Was Set to Blow Up Over US.” November 10, 2010. <http://www.newser.com/tag/55738/1/cargo-bombs.html>.
- Official Journal of the European Union. “Commission Regulation (EC) No 2320/2002 of 16 December 2002.” 2002. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:355:0001:0021:EN:PDF>.
- . “Commission Regulation (EC) No 622/2003 of 4 April 2003.” 2003. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:089:0009:0010:EN:PDF>.
- . “Commission Regulation (EC) No 831/2006 of 2 June 2006.” 2006. <http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:150:0004:0005:EN:PDF>.
- . “Commission Regulation (EC) No 1802/2012 of 9 November 2012.” 2012. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:324:0025:0049:EN:PDF>.
- . *Commission Regulation (EU) N. 185/2010*, March 4, 2010.
- Pasztor, Andy, Keith Johnson, and Daniel Michaels. “Focus on Cargo Security Steps.” *The Wall Street Journal*, November 1, 2010. <http://online.wsj.com/article/SB10001424052748703708404575586811087404960.html>.
- PolicyFutures. “Report of the Presidents Commissions on Aviation Security and Terrorism.” May 15, 1990. [http://www.policyfutures.com/PCAST/PCAST\\_report.pdf](http://www.policyfutures.com/PCAST/PCAST_report.pdf).
- Policy Research Corporation. *The Impact of 100 percent Scanning of U.S. Bound Container on Maritime Transport, Final Report*, 2009.

Poole, Robert. *Toward Risk-Based Aviation Security Policy*. Joint Transportation Research Center, Discussion Paper 2008-23, November 2008.

RAND. Homeland Security and Defense Center. *Modeling Terrorism Risk to the Air Transportation System*, 2012.

Randol, Mark A. *The Department of Homeland Security Intelligence Enterprise, Operational Overview and Challenges for Congress*. CRS Report R40602. Washington, DC: Library of Congress, Congressional Research Service, March 19, 2010. <http://www.fas.org/sgp/crs/homesec/R40602.pdf>.

Sammon, John. “100 Percent Air Cargo Screening: Remaining Steps to Secure Passenger Aircraft. Hearing before the Subcommittee on Transportation Security and Infrastructure Protection.” 2010. <http://www.gpo.gov/fdsys/pkg/CHRG-111hhrg64699/html/CHRG-111hhrg64699.htm>.

Telegraph, The. “Ink Cartridge Bomb Reveals Innovation of Terrorist Group.” October 30, 2010. <http://www.telegraph.co.uk/news/uknews/terrorism-in-the-uk/8098587/Ink-cartridge-bomb-reveals-innovation-of-terrorist-groups.html>.

Transportation Security Administration. “Air Cargo 2012 Spring Conference, TSA Administrator John S. Pistole. Remarks As Prepared for Delivery, Air Cargo 2012 Spring Conference, Miami, Florida, March 20, 2012.” March 20, 2012. <http://www.tsa.gov/press/speeches/air-cargo-2012-spring-conference>.

———. “Air Cargo Strategic Plan.” November 2003. [http://www.tsa.gov/public/interapp/press\\_release/press\\_release\\_0371.xml](http://www.tsa.gov/public/interapp/press_release/press_release_0371.xml).

———. *Cargo Security Sensitive Security Identification Guide*. SSIIDG 0050 Version 1.0, May 2007.

———. “Certified Cargo Screening Program.” (n.d.). <http://www.tsa.gov/certified-cargo-screening-program>.

———. “Frequently Asked Questions.” (n.d.). <http://www.tsa.gov/stakeholders/frequently-asked-questions-1>.

———. “Kip Hawley Assistant Secretary, Transportation Security Administration; Testimony to the Subcommittee on Homeland Security Committee on Appropriations.” 2008. [http://www.tsa.gov/press/speeches/testimony\\_archives.shtm](http://www.tsa.gov/press/speeches/testimony_archives.shtm).

———. “Layers of Security.” (n.d.). <http://www.tsa.gov/about-tsa/layers-security>.

———. “Risk-Based Security Initiatives.” (n.d.). <http://www.tsa.gov/traveler-information/risk-based-security-initiatives>.

- . “The International Air Cargo Association.” May 2008. <http://www.hndl.org/?view&did=14323>.
- . “TSA Canine Program Enhances Air Cargo Security.” October 17, 2008. <http://www.tsa.gov/press/releases/2008/10/17/tsa-canine-program-enhances-air-cargo-security>.
- Trunick, Perry. “Opposition Gathers to H.R. 1 Security Regulations.” *Material Handling & Logistics*, 2007. <http://mhlnews.com/transportation-and-distribution/opposition-gathers-hr-1-security-regulations>.
- U.S. Customs and Border Patrol Transportation Security Administration. *Air Cargo Advanced Screening Pilot Strategic Plan*, March 2012.
- U.S. Department of Homeland Security. U.S. Customs and Border Protection Transportation Security Administration. “Air Cargo Advanced Screening Pilot Strategic Plan.” March 2012. [http://www.cbp.gov/linkhandler/cgov/trade/cargo\\_security/cargo\\_control/acas\\_psplan.ctt/acas\\_psplan.pdf](http://www.cbp.gov/linkhandler/cgov/trade/cargo_security/cargo_control/acas_psplan.ctt/acas_psplan.pdf).
- U.S. Department of State. Diplomacy in Action. “Intelligence and Threat Analysis.” 2013. <http://www.state.gov/m/ds/terrorism/c8584.htm>.
- U.S. General Accounting Office. *Before the Subcommittee on National Security, Veterans Affairs, and International Relations, Committee on Government Reform, House of Representatives, Combating Terrorism, Linking Threats to Strategies and Resources Statement of Norman J. Rabkin, Director National Security Preparedness Issues National Security and International Affairs Division*. (GAO/NSIAD-00-218). Washington, DC: GPO, 2000.
- . *Report to Congressional Requesters, Aviation Security, Vulnerabilities and Potential Improvements for the Air Cargo System*. (GAO-03-344). Washington, DC: GPO, December 2002. <http://www.gao.gov/products/GAO-03-344>.
- . *Report to Congressional Requesters, Combating Terrorism, How Five Foreign Countries Are Organized to Combat Terrorism*. (GAO/NSIAD-00-85). Washington, DC: GPO, April 2000.
- . *Report to Congressional Requesters, Combating Terrorism, Threat and Risk Assessments Can Help Prioritize and Target Program Investments*. (NSIAD-98-74). Washington, DC: GPO, April 1998.
- . *Testimony Before the Subcommittee on Aviation, Committee on Transportation and Infrastructure House of Representatives, Aviation Security, Urgent Issues Need to Be Addressed, Statement of Keith O. Fultz, Assistant Comptroller General, Resources, Community, and Economic Development Division*. (GAO/T-RCED/NSAID-96-251). Washington, DC: GPO, 1996.

- . *Testimony Before the Subcommittee on National Security, Veterans Affairs, and International Relations, Homeland Security, Key Elements of a Risk Management Approach Statement of Raymond J. Decker, Director Defense Capabilities and Management House Committee on Government Reform.* (GAO-02-150T). Washington, DC: GPO, 2001.
- U.S. Government Accountability Office. *Aviation Security, Additional Actions Needed to Meet Domestic and International Challenges.* (GAO/RCED-94-38). Washington, DC: GPO, January 1994. <http://www.gao.gov/products/RCED-94-38>.
- . *Aviation Security; TSA Has Taken Steps To Enhance Its Foreign Airport Assessments, but Opportunities Exist to Strengthen the Program.* (GAO-12-163). Washington, DC: GPO, 2011.
- . *Report to Congressional Requesters, Aviation Security, Actions Needed to Address Challenges and Potential Vulnerabilities Related to Securing Inbound Air Cargo.* (GAO-12-632). Washington, DC: GPO, 2012. <http://www.gao.gov/products/GAO-12-632>.
- . *Report to Congressional Requesters, Aviation Security, Federal Action Needed to Strengthen Domestic Air Cargo Security.* (GAO-06-76). Washington, DC: GPO, 2005. <http://www.gao.gov/products/GAO-06-76>.
- . *Report to the Ranking Member, Committee on Homeland Security, House of Representatives, Transportation Security, Action Needed to Strengthen TSA's Threat Security Assessment Process.* (GAO-13-629). Washington, DC: GPO, 2013. <http://www.gao.gov/assets/660/656051.pdf>.
- . *Testimony Before the Subcommittee on National Security, Homeland Defense, and Foreign Operations, Committee on Oversight and Government Reform, House of Representatives. Aviation Security, TSA Has Taken Actions to Improve Security, but Additional Efforts Remain, Statement of Stephen M. Lord, Director Homeland Security and Justice Issues.* (GAO-11-807T). Washington, DC: GPO, 2011. <http://www.gao.gov/products/GAO-11-807T>.
- . *Testimony before the Subcommittee on Transportation Security and Infrastructure Protection, Committee on Homeland Security, House of Representatives Aviation Security, Transportation Security Administration May Face Resource and Other Challenges in Developing a System to Screen All Cargo Transported on Passenger Aircraft, Statement of Cathleen A. Berrick, Director Homeland Security and Justice Issues.* (GAO-08-959T). Washington, DC: GPO, 2008. <http://www.gao.gov/products/GAO-08-959T.pdf>.

- . *Testimony Before the Subcommittee on Transportation Security and Infrastructure Protection, Homeland Security Committee, House of Representatives Department of Homeland Security: Progress Report on Implementation of Mission and Management Principles in Homeland Security, Statement of Norman J. Rabkin, Managing Director, Homeland Security and Justice.* (GAO-08-904T). Washington, DC: GPO, 2008.
- U.S. Government Printing Office. “49 CFR Part 1542–Airport Security.” 2010. <http://www.gpo.gov/fdsys/granule/CFR-2010-title49-vol9/CFR-2010-title49-vol9-part1542/content-detail.html>.
- . “49 CFR Part 1544.205–Aircraft Operator Security: Air Carriers and Commercial Operators.” 2010. <http://www.gpo.gov/fdsys/granule/CFR-2010-title49-vol9/CFR-2010-title49-vol9-part1544/content-detail.html>.
- . “49 CFR Part 1548–Indirect Air Carrier Security.” 2002. <http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr;sid=c60b3377d4eaafad4feeecc6cd8f29983;rgn=div5;view=text;node=49 percent3A9.1.3.5.13;idno=49;cc=ecfr>.
- . *49 CFR–Part 1548 Indirect Air Carrier Security Section 1 Applicability*, 2010.
- . *Air Cargo Security*, CRS Report RL32022. Washington, DC: Office of Congressional Information and Publishing, July 30, 2007. <http://www.fas.org/sgp/crs/homesec/RL32022.pdf>.
- Washington Post*. “The Bombing of Pan Am Flight 103.” 1999. <http://www.washingtonpost.com/wp-srv/inatl/longterm/panam103/timeline.htm>.
- Widdowson, David, and Stephen Holloway. “Maritime Transport Security Regulation: Policies, Probabilities and Practicalities.” *World Customs Journal* 3, no. 2 (2009). <http://www.internationaltransportforum.org/2009/forum2009.html>.

**THIS PAGE INTENTIONALLY LEFT BLANK**

## SOURCES CONSULTED

- Adler, Jack. "New Rules to Toughen Airport Security Offer Protection for Travelers: Legislation: Spurred by Lockerbie Bombing, Federal Bill Calls for Greater Stringency in Issuing ID Badges and Higher Standards for Airline Screening Personnel." *Los Angeles Times*, November 24, 1991. [http://articles.latimes.com/1991-11-24/travel/tr-14\\_1\\_airport-security-personnel](http://articles.latimes.com/1991-11-24/travel/tr-14_1_airport-security-personnel).
- Bai, Jun, ed. *Aviation Security: Foreign Airports and Inbound Air Cargo*. New York, NY: Nova Science, 2013.
- Berrick, Cathleen A. *Review of the Transportation Security Administration's Air Cargo Screening Exemptions Report*. Washington, DC: GPO, 2008. <http://purl.access.gpo.gov/GPO/LPS105254>.
- Biesecker, Calvin. "CBP Expects to Test New Air Cargo Security Strategies This Year." *Defense Daily* 248, no. 32 (November 17, 2010).
- Bingham, Philip R., John Bush, Biays Bowerman, Ernesto Cespedes, and Tim White. *National Security Science and Technology Initiative: Air Cargo Screening*. Final Report for CRADA Number NFE-07-01081. Oak Ridge, TN: Oak Ridge National Laboratory, 2010. <http://www.hndl.org/?view&did=12261>.
- Bonner, Raymond, and Benjamin Weiser. "Echoes of Early Design to Use Chemicals to Blow Up Airliners." *New York Times*, August 11, 2006. [http://www.nytimes.com/2006/08/11/world/europe/11manila.html?\\_r=0](http://www.nytimes.com/2006/08/11/world/europe/11manila.html?_r=0).
- Bos, Greg. "Ex-Minister Says Gaddafi Ordered Lockerbie Bomb." *Reuters*, February 23, 2011. <http://www.reuters.com/article/2011/02/23/us-libya-protests-lockerbie-idUSTRE71M54A20110223>.
- CAPA—Centre for Aviation. "Mixed Outlook for Global Air Freight in 2011. Still Awaiting Confirmation of Growth Trend." December 23, 2010. <http://centreforaviation.com/analysis/mixed-outlook-for-global-air-freight-in-2011-still-awaiting-confirmation-of-growth-trend-42445>.
- Casciani, Dominic. "Liquid Bomb Pot: What Happened." *BBC News*, September 7, 2009. [http://news.bbc.co.uk/2/hi/uk\\_news/8242479.stm](http://news.bbc.co.uk/2/hi/uk_news/8242479.stm).
- Crowe, Alice. "Safety Act Liability Protections for Air Cargo Screeners." *The Air and Space Lawyer* 23, no. 4 (2011): 4–8.
- "DHS Picks Non-Intrusive Air Cargo Scanner Designer." *Government Video* 22, no. 3 (February 2011): 29.

- Department of Homeland Security. “C-TPAT: Customs-Trade Partnership Against Terrorism.” *CBP.gov*. (n.d.). [http://www.cbp.gov/xp/cgov/trade/cargo\\_security/ctpat/](http://www.cbp.gov/xp/cgov/trade/cargo_security/ctpat/).
- Elias, Bart. *Air Cargo Security*. CRS Report RL32022. Washington, DC: Library of Congress, Congressional Research Service, July 30, 2007. <http://www.fas.org/sgp/crs/homesec/RL32022.pdf>.
- Elias, Bartholomew. *Airport and Aviation Security: U.S. Policy and Strategy in the Age of Global Terrorism*. Boca Raton, FL: CRC Press, 2010.
- Ezell, Barry Charles, Steven P. Bennett, Detlof Von Winterfeldt, John Sokolowski, and Andrew J. Collins. “Probabilistic Risk Analysis and Terrorism Risk.” *Risk Analysis* 30, no. 4 (April 2010): 575–589.
- Federal Register. “Air Cargo Advance Screening (ACAS) Pilot Program.” 77, no. 206 (October 24, 2012): 65006–65009. <https://www.federalregister.gov/articles/2012/10/24/2012-26031/air-cargo-advance-screening-acas-pilot-program>.
- Frittelli, John F. *Port and Maritime Security*. CRS Report RL31733. Washington, DC: Library of Congress, Congressional Research Service, December 5, 2003. <http://openocrs.com/document/RL31733>.
- Hall, Randolph W. *Alternative Access and Locations for Air Cargo*. Los Angeles, CA: University of Southern California, June 13, 2002. [http://www.metrans.org/research/final/00-03\\_Final.pdf](http://www.metrans.org/research/final/00-03_Final.pdf).
- Harrington, Lisa H. “Air Cargo's Highs and Lows.” *Inbound Logistics* 25, no. 10 (2005): 38–40, 42, 44.
- Hawley, Edmund S., and Nathan Means. *Permanent Emergency: Inside the TSA and the Fight for the Future of American Security*. New York: Palgrave Macmillan, 2012.
- Hughes, David. “A Bomb in the Fish?: U.S. Tests Equipment to Find Explosives in Air Cargo.” *Aviation Week & Space Technology* 166, no. 18 (May 7, 2007): 64.
- Jackson, David P. “Intelligence-Led Risk Management for Homeland Security.” Master’s thesis, Naval Postgraduate School, 2011, <http://www.hndl.org/?abstract&did=699697>.
- Karp, Aaron. “Air Cargo Flattens Out.” *Air Transport World* 46, no. 1 (2009): 37–39.

Kersey, J. W. "The Economics of Air Cargo (Analysis of Economic Factors Involved in Air Cargo Operations and Air Cargo Market Development)." In *MIT MIT-NASA Workshop on Airline Systems Analysis*, vol. 2. Edited by Joseph F. Vittek. 23–34. Cambridge, MA: Flight Transportation Laboratory, Dept. of Aeronautics and Astronautics, Massachusetts Institute of Technology, 1972. <http://hdl.handle.net/1721.1/67979>.

Knapp, Lewis G. *Forward Area Air Cargo Systems*. New York, NY: Society of Automotive Engineers, 1968.

Lewis, Scott. "Exclusive: FBI Agents Reveal Underwear Bomber Abdulmutallab Wore Explosive Underwear for Three Weeks." *ABC 7 Action News*. [http://www.wxyz.com/dpp/news/local\\_news/investigations/fbi-agents-underwear-bomber-abdulmutallab-wore-underwear-for-3-weeks](http://www.wxyz.com/dpp/news/local_news/investigations/fbi-agents-underwear-bomber-abdulmutallab-wore-underwear-for-3-weeks).

Logan, Michael J. 2020: *Future Vision for Global Air Cargo*. Hampton, VA: NASA Langley, 1998. <http://www.cs.odu.edu/~mln/ltrs-pdfs/NASA-aiaa-98-0437.pdf>.

Masferrer Domingo, Aniceto. *Post 9/11 and the State of Permanent Legal Emergency Security and Human Rights in Counteracting Terrorism*. Dordrecht; NY: Springer, 2012.

Michaels, Daniel. "EU to Step Up Air-Cargo Rules." *Wall Street Journal (Online)*, November 29, 2010.

Miller, John. "Would-be Underwear Bomber a Double Agent." *CBS News*, May 8, 2012. [http://www.cbsnews.com/8301-18563\\_162-57430472/would-be-underwear-bomber-a-double-agent/](http://www.cbsnews.com/8301-18563_162-57430472/would-be-underwear-bomber-a-double-agent/).

Moorman, Robert W. "Air Cargo." *Air Transport World* 43, no. 3 (March 2006): 40–42.

National Commission on Terrorist Attacks Upon the United States. *9-11 Commission Report: Final Report of the National Commission on Terrorist Attacks upon the United States*. Washington, DC: National Commission on Terrorist Attacks Upon the United States, 2004. <http://govinfo.library.unt.edu/911/report/>.

"Other Shoe Drops: Securing Cargo Plays a New Role in Safety Score, The." *Fleet Owner* 105, no. 11 (2010): 30–31.

Paczkowski, John P. "Risk Management as Strategic Change in National Homeland Security Policy." Master's thesis, Naval Postgraduate School, 2007. <http://www.hndl.org/?abstract&did=479339>.

"Priorities for Air Cargo." Press Release No. 13. *M2 Presswire*, March 12, 2013.

Public Intelligence. "Inspire Al-Qaeda in the Arabian Peninsula Magazine," no. 10 (March 2013). <http://publicintelligence.net/aqap-inspire-issue-10>.

Ramachandran, Girish, and Sanjay Tiwari. "Challenges in the Air Cargo Supply Chain." *Communications of the ACM* 44, no. 6 (June 2001): 80–82.

Rountree, Carla D., and Michael J. Demetsky. *Development of Counter Measures to Security Risks from Air Cargo Transport*. Charlottesville, VA: University of VA, Center for Transportation Studies, 2004. <http://cts.virginia.edu/docs/UVACTS-5-14-63.pdf>.

Smith, R. Jeffrey. "Recent Crashes Caused by Bombings." *Washington Post*, July 21, 1996. <http://www.washingtonpost.com/wp-srv/national/longterm/twa800/bomb.htm>.

Smith, Steve. "A Primer on Air Cargo Security." *Ground Support Worldwide* 20, no. 7 (September 2012): 16–19.

Subhedar, Vinit, Victor Zaloom, and Hsing-wei Chu. *An Analysis of the Correlation of Expert Opinions in Security Risk Assessment*. 14th ISSAT Conference on Reliability and Quality in Design. Orlando, Florida, August 7–9, 2008. [http://dept.lamar.edu/industrial/Ports/ISSAT\\_Conference\\_Proceeding\\_2008Analysis\\_of\\_Correlation\\_in\\_Delphi\\_Responses\\_rev.pdf](http://dept.lamar.edu/industrial/Ports/ISSAT_Conference_Proceeding_2008Analysis_of_Correlation_in_Delphi_Responses_rev.pdf).

Sutton, R. M. "Future Trends, Shipper to Terminal (Air Cargo Service Improvements in Terms of Shipper Requirements, Discussing Economics of Ground Handling and Control)." In *International Forum for Air Cargo*. F-1–F-7. New York, NY: Society of Automotive Engineers, 1964.

Sweet, Kathleen M. "Air Cargo Security: The Cost of Doing Business in the 21st Century." *Journal of Aviation/Aerospace Education and Research* 16, no. 3 (Spring 2007): 37–44.

"TSA Proposes Tougher Air Cargo Rules." *Transport Topics*, no. 3614 (November 15, 2004): 4.

Transportation Security Administration. "Air Cargo Advance Screening Pilot." December 12, 2012. <http://www.tsa.gov/air-cargo-advance-screening-pilot>.

———. "Air Cargo, Office of Security Policy and Industry Engagement." Last revised January 9, 2013. <http://www.tsa.gov/stakeholders/air-cargo>.

———. "Programs and Initiatives: Air Cargo." November 14, 2013. <http://www.tsa.gov/stakeholders/programs-and-initiatives-1>.

U.S. General Accountability Office. *Report to Congressional Requesters. Aviation Security: Federal Efforts to Secure U.S.-Bound Air Cargo are in the Early Stages and could be Strengthened*. (GAO-07-660). Washington, DC: GPO, 2007. <http://www.gao.gov/products/GAO-07-660>.

- \_\_\_\_\_. *Report to Congressional Requesters. Aviation Security: TSA has made Progress but Faces Challenges in Meeting the Statutory Mandate for Screening Air Cargo on Passenger Aircraft.* (GAO-10-446). Washington, DC: GPO, 2010. <http://www.gao.gov/products/GAO-10-446>.
- \_\_\_\_\_. *Report to Congressional Requesters. Container Security: Expansion of Key Customs Programs Will Require Greater Attention to Critical Success Factors.* (GAO-03-770). Washington, DC: GPO, 2003. <http://www.gao.gov/products/GAO-03-770>.
- \_\_\_\_\_. *Report to Congressional Requesters. Supply Chain Security: U.S. Customs and Border Protection has Enhanced its Partnership with Import Trade Sectors, but Challenges Remain in Verifying Security Practices.* (GAO-08-240). Washington, DC: GPO, 2008. <http://www.gao.gov/products/GAO-08-240>.
- \_\_\_\_\_. *Testimony Before the Committee on Commerce, Science and Transportation, U.S. Senate. Aviation Security: Progress since September 11, 2001, and the Challenges Ahead. Statement of Gerald L. Dillingham, Director, Civil Aviation Issues.* (GAO-03-1150T). Washington, DC: GPO, 2003. <http://www.gao.gov/products/GAO-03-1150T>.
- \_\_\_\_\_. *Testimony Before the Committee on Commerce, Science, and Transportation, United States Senate. Transportation Security: Systematic Planning Needed to Optimize Resources.* (GAO-05-357T). Washington, DC: GPO, 2005. <http://www.gao.gov/products/GAO-05-357T>.
- \_\_\_\_\_. *Testimony Before the Permanent Subcommittee on Investigations, Committee on Homeland Security and Governmental Affairs, United States Senate. Homeland Security: Key Cargo Security Programs Can Be Improved. Statement of Richard M. Stana, Director, Homeland Security and Justice Issues.* (GAO-05-466T). Washington, DC: GPO, 2005. <http://www.gao.gov/products/GAO-05-466T>.
- \_\_\_\_\_. *Testimony Before the Subcommittee on Transportation Security and Infrastructure Protection, Committee on Homeland Security, House of Representatives. Aviation Security: Preliminary Observations on TSA's Progress and Challenges in Meeting the Statutory Mandate for Screening Air Cargo on Passenger.* (GAO-09-422T). Washington, DC: GPO, 2009. <http://www.gao.gov/products/GAO-09-422T>.
- \_\_\_\_\_. *Testimony Before the Subcommittee on Transportation Security and Infrastructure Protection, Committee on Homeland Security, House of Representatives. Aviation Security: Progress Made but Actions Needed to Address Challenges in Meeting the Air Cargo Screening Mandate. Statement of Steve Lord, Director Homeland Security and Justice Issues.* (GAO-10-880T). Washington, DC: GPO, 2010. <http://www.gao.gov/products/GAO-10-880T>.

- . *Testimony Before the Subcommittee on Transportation Security, Committee on Homeland Security, House of Representatives. Aviation Security: Progress Made, but Challenges Persist in Meeting the Screening Mandate for Air Cargo. Statement of Steve Lord, Director Homeland Security and Justice Issues.* (GAO-11-413T). Washington, DC: GPO, 2011. <http://www.gao.gov/products/GAO-11-413T>.
- . *Testimony Before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, House of Representatives. Aviation Security: Challenges Exist in Stabilizing and Enhancing Passenger and Baggage Screening Operations. Statement of Cathleen A. Berrick, Director, Homeland Security and Justice.* (GAO-04-440T). Washington, DC: GPO, 2004. <http://www.gao.gov/products/GAO-04-440T>.
- U.S. Government Printing Office. “Extension of the Air Cargo Advance Screening (ACAS) Pilot Program and Reopening of Application Period for Participation.” *Federal Register* 78, no. 78 (April 23, 2013): 23946–23947.
- . “Privacy Act of 1974; U.S. Customs and Border Protection, DHS/CBP-006—Automated Targeting System, System of Records.” *Federal Register* 77, no. 99 (May 22, 2012): 30297–30304. <http://www.gpo.gov/fdsys/pkg/FR-2012-05-22/html/2012-12396.htm>.
- U.S. House. Committee on Homeland Security. Subcommittee on Economic Security, Infrastructure Protection, and Cybersecurity. *H.R. 4954: The SAFE Port Act : Hearing before the Subcommittee on Economic Security, Infrastructure Protection, and Cybersecurity of the Committee on Homeland Security, House of Representatives.* 109th Cong. 2nd. sess., March 16, 2006. Washington, DC: U.S. Government Printing Office, 2007. <http://purl.access.gpo.gov/GPO/LPS88027>; <http://purl.access.gpo.gov/GPO/LPS88028>.
- . Subcommittee on Transportation Security. *Securing Air Commerce from the Threat of Terrorism: Hearing before the Subcommittee on Transportation Security of the Committee on Homeland Security, House of Representatives.* 112th Cong. 1st sess., March 9, 2011. Washington, DC: U.S. Government Printing Office, 2012. <http://www.gpo.gov/fdsys/pkg/CHRG-112hhrg72219/pdf/CHRG-112hhrg72219.pdf>.
- . Subcommittee on Transportation Security and Infrastructure Protection. *100 Percent Air Cargo Screening Remaining Steps to Secure Passenger Traffic: Hearing before the Subcommittee on Transportation Security and Infrastructure Protection of the Committee on Homeland Security, House of Representatives.* 111th Cong. 2nd sess., June 30, 2010. Washington, DC: U.S. Government Printing Office, 2011. <http://www.gpo.gov/fdsys/pkg/CHRG-111hhrg64699/pdf/CHRG-111hhrg64699.pdf>.

- \_\_\_\_\_. *Testimony of Michael C. Mullen Executive Director Express Association of America. Committee on Homeland Security Subcommittee on Transportation Security United States House of Representatives. Hearing on: TSA'S Efforts to Advance Risk-Based Security: Stakeholders' Perspectives*. April 11, 2013. <http://docs.house.gov/meetings/HM/HM07/20130411/100567/HHRG-113-HM07-Wstate-MullenM-20130411.pdf>.
- U.S. Office of Civil Aviation Security. *Criminal Acts Against Civil Aviation*, 1987.
- U.S. Senate. *Aviation Security Improvement Act: Report of the Committee on Commerce, Science, and Transportation on S. 509*. 110th Cong. 1st sess., Washington, DC: U.S. Government Printing Office, March 5, 2007.
- \_\_\_\_\_. Committee on Commerce, Science, and Transportation. *Air Cargo Security Improvement Act: Report of the Committee on Commerce, Science, and Transportation on S. 165*. 108th Cong. 1st sess., April 24, 2003. Washington, DC: U.S. Government Printing Office, 2011. <http://purl.access.gpo.gov/GPO/LPS31395>.
- \_\_\_\_\_. Committee on Homeland Security and Governmental Affairs. *Closing the Gaps in Air Cargo Security: Hearing before the Committee on Homeland Security and Governmental Affairs, United States Senate*. 111th Cong. 2nd sess., November 16, 2010. Washington, DC: U.S. Government Printing Office, 2011. <http://purl.fdlp.gov/GPO/gpo17453>.
- \_\_\_\_\_. Homeland Security and Governmental Affairs Committee. *Border Security: Frontline Perspectives on Progress and Remaining Challenges*. 112th Cong. 2nd sess., April 10, 2013.
- \_\_\_\_\_. *Implementation of the Aviation and Transportation Security Act: Hearing before the Committee on Commerce, Science, and Transportation, United States Senate*. 117th Cong. 2nd sess., February 5, 2002. Washington, DC: U.S. Government Printing Office. <http://www.hndl.org/?view&did=236596>.
- \_\_\_\_\_. Permanent Subcommittee on Investigations. *The Container Security Initiative and the Customs-Trade Partnership Against Terrorism: Securing the Global Supply Chain Or Trojan Horse?: Hearing before the Permanent Subcommittee on Investigations of the Committee on Homeland Security and Governmental Affairs, United States Senate*. 109th Cong. 1st sess., May 26, 2005. Washington, DC: U.S. Government Printing Office, 2005. <http://purl.access.gpo.gov/GPO/LPS66576>.
- \_\_\_\_\_. *S. 1447: Implementation of the Aviation and Transportation Security Act: Hearing before the Committee on Commerce, Science, and Transportation, United States Senate*. 117th Cong. 2nd sess., May 21, 2002. Washington, DC: U.S. Government Printing Office, 2005. <http://www.gpo.gov/fdsys/pkg/CHRG-107shrg91255/pdf/CHRG-107shrg91255.pdf>.

———. Subcommittee on Aviation. *Aviation Security and Impacts Associated with the Regulatory and Statutory Requirements of the Aviation and Transportation Security Act (ATSA): Hearing before the Subcommittee on Aviation of the Committee on Commerce, Science, and Transportation. United States Senate*. 108th Cong. 1st sess., February 5, 2003. Washington, DC: U.S. Government Printing Office, 2006. <http://purl.access.gpo.gov/GPO/LPS70426>.

White House Commission on Aviation Safety and Security (U.S.). *Final Report to President Clinton*. Washington, DC: The Commission, 1997. <http://purl.access.gpo.gov/GPO/LPS19581>.

Willis, Henry H., and Tom LaTourrette. "Using Probabilistic Terrorism Risk Modeling for Regulatory Benefit-Cost Analysis: Application to the Western Hemisphere Travel Initiative in the Land Environment." *Risk Analysis* 28, no. 2 (April 2008): 325–339.

Zhang, Anming. "Electronic Technology and Simplification of Customs Regulations and Procedures in Air Cargo Trade." *Journal of Air Transportation* 7, no. 2 (2002): 87–102. [http://ntl.bts.gov/lib/000/700/744/JAT\\_7-2-4.pdf](http://ntl.bts.gov/lib/000/700/744/JAT_7-2-4.pdf).

## **INITIAL DISTRIBUTION LIST**

1. Defense Technical Information Center  
Ft. Belvoir, Virginia
2. Dudley Knox Library  
Naval Postgraduate School  
Monterey, California